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Training Foundry Apprentices

Boys Should Be Taught to Make Molds from First Day in Shop—Cooperation of Foremen Is Essential

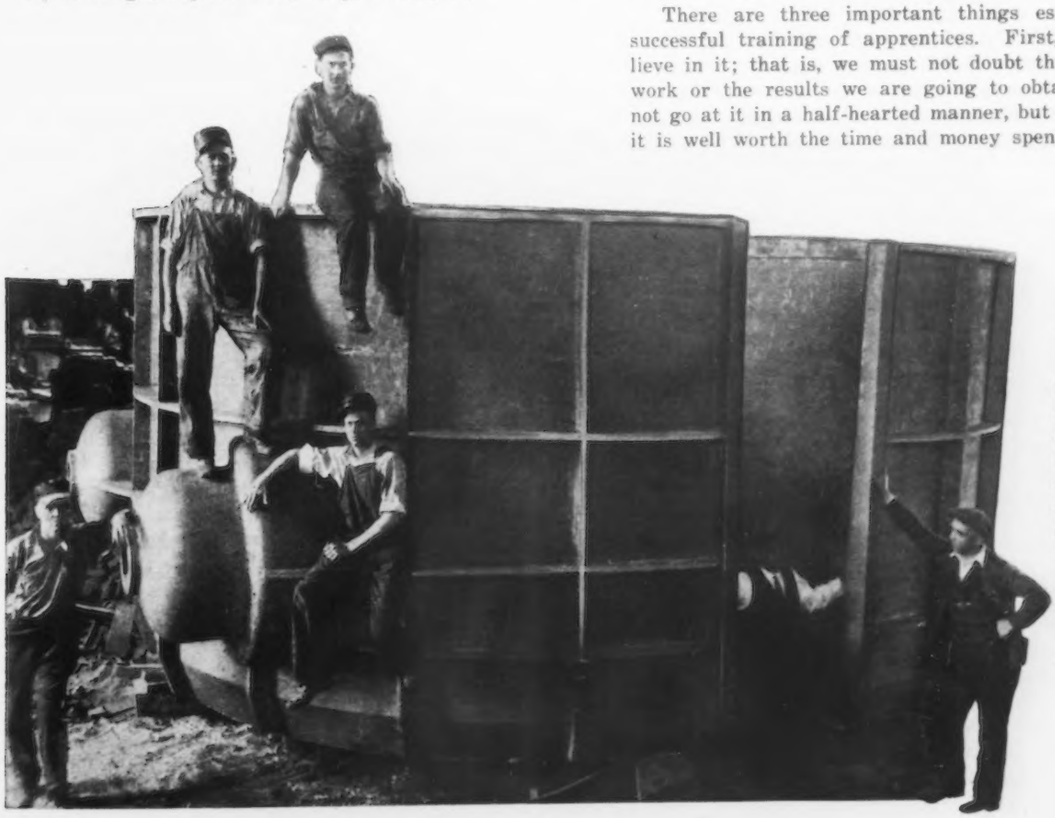
BY P. R. RAMP*

INSTEAD of being trained with the idea of qualifying for an executive position, foundry apprentices should be taught to do good shop work at a reasonable cost. Some, of course, will eventually become foremen and superintendents, but they must first become good mechanics.

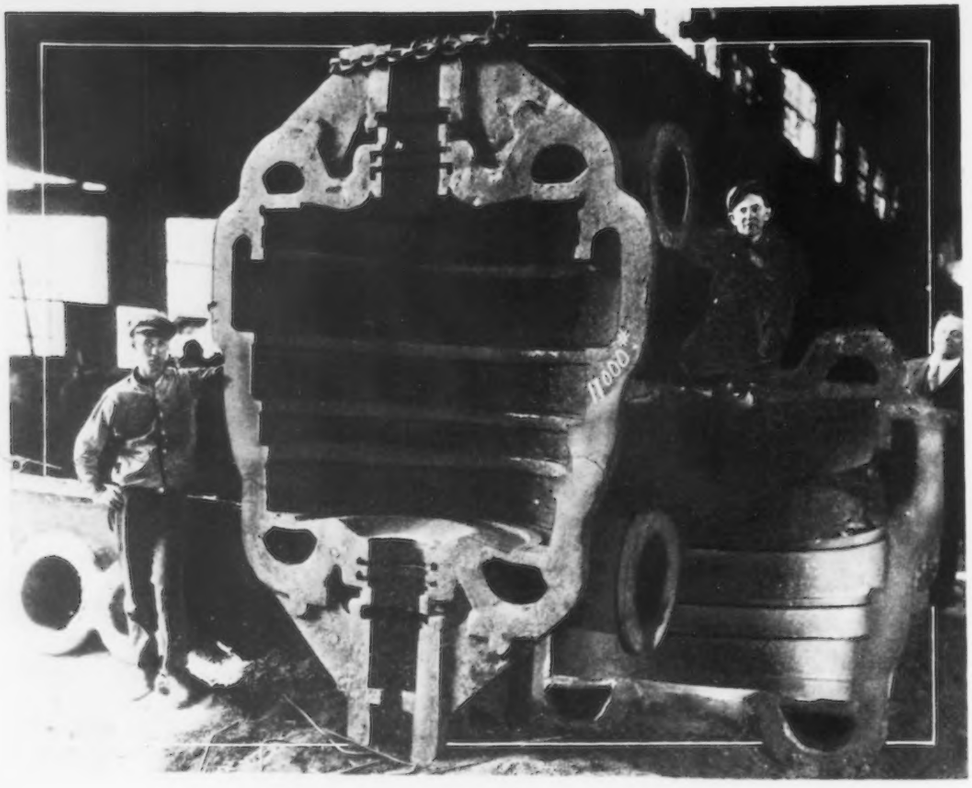
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For this reason I believe it a good investment to teach them every detail connected with the trade without trying to encourage them by telling them they are all going to be "bosses." I am mentioning this because it is a method often used in an effort to interest boys in the molding trade; what it often does is to start the boy dreaming about the time when he will be "boss" and he soon becomes an observer instead of a worker.

There are three important things essential to the successful training of apprentices. First, we must believe in it; that is, we must not doubt the value of the work or the results we are going to obtain. We must not go at it in a half-hearted manner, but must feel that it is well worth the time and money spent. Second, we



THREE Young Men Sitting on This Pit Liner Casting Made This Mold and Many Other Similar Castings Under the Guidance of an Instructor. This casting, 20 ft. in diameter, was made in one piece and split



TWO Boys Molded This Casting in Dry Sand Rammed in a Flask in Three Days. It generally takes two molders two weeks to make a similar casting in loam

must want to do it, rather than be persuaded against our will to try it out for a while. Third, we must interest the boys in their work. When we believe in it and want to do it and have the boys in an enthusiastic frame of mind, training apprentices becomes not only a simple matter, but interesting and enjoyable work.

Foremen Must Cooperate

Before a company can get results from its apprenticeship training program, its foremen must be sold on the plan.

A good instructor may be in charge of the work, but if he does not receive the hearty cooperation of the foreman in charge of the shop his efforts will be of little value. The foreman can show his willingness to help by giving the instructor all the work he needs for his students, by allowing him a free hand in directing his boys and by assuming a friendly attitude. He also must realize that he is going to get the benefit of every properly trained mechanic.

Selection of the right kind of instructor is important. He should be a good mechanic with progressive ideas and must not be afraid to get his hands dirty. He must be full of zest for his work, because he will have a live gang to take care of, and consequently must be on the job all the time to advise and instruct the boys. He must answer numerous questions daily, and the same ones many times. It is his job to keep the boys interested and enthusiastic about the trade they are learning.

Some foundrymen believe that the best way to start a new boy in foundry work is to let him watch the activities around the shop a few weeks before giving him any special work to do, so that he will become interested and also learn a great deal by observation that will be of value to him when he begins to mold. I believe this is a mistake, because the boy will learn very little by watching others. However, start him making molds with his own hands the first day he is in the shop and he will be interested immediately and will be able to learn quickly what others are doing around him. In this manner he will have a desire to know more about the trade.

Start the boy molding. Do not let him shovel sand for another boy, but give him his own pattern, his own flask, his own sand heap and tools and show him how to make a mold. Then there will be no danger of his becoming lazy, losing interest or finding something else easier to learn. We have found that the first three weeks of a boy's time spent in the shop are the most important and therefore should be full of interesting work.

The way we start the boy has a great deal to do with how much enthusiasm he shows and how well he gets along.

Of course, we cannot force him to think, but we can encourage him by giving him something to think about. We can do this the first day by having him work with his own hands.

It is all right to prepare the boy's mind for what we are going to teach him, but it is not safe to do so much preparing before he does any actual work that he may lose his interest. This point is aptly illustrated by the manner in which a man learns to drive an automobile. He is not taken around to see numerous automobiles for a week in order to prepare his mind for what he is going to learn. Instead he gets into the driver's seat at once and his instructor sits beside him and teaches him every move. The result is that in one hour he learns more about operating the car by actual practice than he would learn in two weeks by observation. The same thing applies to teaching a young man how to mold. It is a waste of time to teach him all about the materials he is going to use before he is permitted to use them. What we must do first is to create a desire in the boy to become a good molder. It is immaterial whether he knows what molding sand is, how plumbago is made, and whether ramming should be called tamping, packing or jolting. We want to start him molding and teach him the other details later

when he gets to the point where he wants to know about them.

Boy Makes His Own Mold

A good example of how this works out is the case of a young man who recently began as an apprentice in one shop. On the first day the instructor made a small mold for him while he looked on, explaining each operation as he performed it. Next the boy made the same mold while the instructor stood by and watched him. When the boy forgot something, the instructor would stop him and give him several moments to see if he could recall what he was neglecting to do. In most cases he remembered the proper procedure, but one or two times he had to be told what to do.

After the mold was made under the instructor's supervision, the boy was told to make the same mold with no one watching him. This usually requires considerable time, but in about 20 min. the boy reported to the instructor that he had completed the mold with the exception of "cutting the ditch." He had learned how to make the mold, but had not been at the business long enough to learn that the channel leading from the down gate to the mold was called a gate. But what difference did it make? A properly cut ditch will run a mold just as well as a properly cut gate.

An excellent way to interest boys in their work and create a spirit of pride is to have photographs taken of castings they have made with them standing by. I venture the opinion that they will be prouder of the photograph showing them standing beside the marine cylinder they have made than of any other picture they possess.

Do Not Put Boys on Production

Do not put apprentice boys on production. This expression is not always understood, some getting the idea that it means that no effort should be made to teach them to work fast and economically. What it really means is that if a boy has been a success getting out an order of washers or pistons, he should not be continued in the same type of work. We do not want to train boys to become special purpose workers, but rather to be all around mechanics, and this cannot be done by keeping them constantly on washers, pistons or drill presses.

It is an advantage to secure an apprentice who has a good school record, but a poor scholastic standing should not disqualify him from learning the molding trade. In fact, the boy with the good school record should not be given the preference unless he is also good in shop work and in general aptitude. Frequently a boy who has served part of his apprenticeship becomes so interested in his work that he takes up special courses of study at night school so that he will be prepared to handle the larger problems connected with the trade. It would be unfortunate to have prevented the boy from starting to learn the trade because he had not previously realized the importance of school work.

One of our boys who has just completed his apprenticeship had a difficult time in school and at one time we were obliged to lay him off for several months until he agreed to work harder in class. His school average was generally below 60 per cent, but his work in the foundry was 100 per cent. He has become one of our leading molders. In the past we have lost several boys, who were developing into good loam molders, on account of their school work. They failed in school, after refusing to study, but apparently were born mechanics. At present we have a young man who has a splendid school record, but his shop record is poor and, in spite of all we have done, we cannot make a good molder of him.

Advancement Should Not Depend Solely on School Work

For this reason I do not believe it wise to make hard and fast rules when specifying who shall be permitted to learn the molding trade. Neither should we decide apprentices' chances of advancement solely upon their school work, especially if they are making good progress in the shop.

We have aroused considerable interest among the boys by athletic competition, so that they are proud to belong to the apprentices' team. A certain amount of this is a good thing, but we must be careful not to create more enthusiasm for the ball game than for the molding



THIS Boy, Small for His Age, Worked on This Loam Job When He Had Been in the Foundry Less Than a Year. With a little coaching he readily grasped the molding idea. The mold he is sweeping up in loam is a small condenser cover

trade. We must not forget that a good ball player does not mean a good molder.

Another way to work up interest among apprentices is to put learning on a competitive basis. It is just as easy to choose sides for a game of molding as it is for a game of ball. One group of apprentices can be matched against another group with the superintendent or instructor as umpire. One game can be the percentage of good castings, another the greatest number of intricate castings produced by a group. A high percentage of good work will qualify the groups to take on more difficult tasks.

When these contests are properly managed, they excite a great deal more interest than a ball game. Everyone is a player and the best feature is that the boys use their heads and their energy in trying to become good or better molders in order to beat the group opposing them. When a real molding contest extending over an entire year is put on, the boys often can hardly wait to get to the shop. They talk about it, dream about it and tell their best girls about it. That is what makes good molders and men who love their work. A weekly honor roll showing the standing of each man and each group of men relative to their percentage of good castings should be kept. This also works up considerable enthusiasm.

Details Should Not Be Neglected

Many important things often are neglected in teaching apprentices. Sometimes they are neglected because they are not considered necessary and sometimes because the teacher does not know about them. In such cases we are teaching the boy to walk before he can crawl, and the result is he becomes an imitator instead of a good mechanic. Why should a boy be taught the effects of silicon in cast iron and at the same time not be shown how to tuck sand around a pattern. He can make good castings if he never knows the effects of silicon in cast iron.

If we want to make molders, they should be taught how to place their patterns in a flask, how to riddle the sand, how to hold the riddle, how to hold the rammer, how to ram a drag mold, how to ram between bars, how to place gaggers, how to tuck bars, how to vent a mold, how to cut a gate, how to prepare a gate that the metal will not cut, how to carry off the gas from cores, how to apply facing to a pattern, how to make a parting, how to hold a trowel, how and when to use feeding heads and risers, how to place cores in a mold, how to hold cores in their proper position in a mold, how to secure a core print, how to make a clean mold, how to pour a mold, how and where to ram soft, how and where to ram hard, how to prevent a scab or a cut, how to prevent a burn down, how to prevent a blister, how to prevent a cold shut, how to prevent blow holes, shrinkage holes, and strains, how to set up a sweep, how to lay loam brick, how to apply loam, how to make a loam seat, how to build a runner box, and how to build a cinder bed.

Boys Taught to Do Work in Specified Manner

At the same time they must be taught why all of these things are done in a specified manner and what would happen if the work were not done that way.

A good example of how an apprentice can go astray unless he is taught the necessary details is a young man who saw an old molder ramming a fire brick over the core prints on a pipe pattern in order to provide a more solid bearing for the core in the drag part of the mold. The boy thought this was a good thing, and later on when he received a pipe pattern to mold, he decided to use a similar support on his core prints. Unable to find a couple of fire bricks, he went to the carpenter's shop and secured two pieces of 2 x 4 in. lumber about the same size as the brick. He saw no reason why they would not hold the core as well as the brick. They did hold the core, but when the metal came in contact with the wooden blocks a terrible commotion occurred, and much to the young man's dismay his casting was a failure. If he had been under the direct supervision of a practical instructor he would have known that melted iron will not lie quietly on wooden blocks.

Boys Should Not Work with Experienced Molders

Good mechanics can best be produced by having boys work for the first two years in a shop by themselves or in a part of the shop away from the journeymen molders, directly under the supervision of instructors. When working with molders, they generally become nothing more than good helpers, because the molders seldom allow them to do any important work. Moreover the molders do not take time to explain why they do certain things and consequently the boys' time is about 75 per cent wasted.

On the other hand, when boys are actually working under an instructor's supervision, they are told how to do the work and why it should be done that way. It is safe to assume that they learn more in one day working by this method than in 20 days working with molders.

We tried working one of our apprentice boys with a molder on a large loam job. As I passed him one day I saw him standing around apparently doing nothing. I asked him what he was doing. He twisted his face in a disgusted sort of way and said, "Oh! I am doing the heavy looking on." This was true. The molder was doing all the work himself while the boy stood around getting more disgusted and more discouraged every hour.

Spirit of Practical Joking Objectionable

The spirit of practical joking on the part of molders is another objection to doubling apprentices with them. Molders are inclined to "kid" the boys. Probably this is in a spirit of fun, but such things tend to decrease the seriousness of the work. Many apparently harmless jokes they play hurt the boys by making them afraid to do things for fear they will make a mistake and be ridiculed.

For instance, in a shop where the apprentices work with the molders, one day I found a young man painting the outside of his snap molds with plumbago, because he said a molder told him that that was the way to produce smooth castings. Another time I found a boy looking all over the shop for a clamp stretcher which the molder wanted. Another young man just starting was very much worried because one of the molders had told him he had the sand in his first flask upside down.

We have successfully trained apprentices in the pattern shop and foundry because we have been able to enlist the aid of our foremen. This cannot be done in one day, but only by keeping everlastingly after the foremen until they are interested to a point where they want to do all they can to help.

The instructors of apprentices have a big job and need all the help they can get. My plan is to furnish the instructor with a list of operations for each kind of work and a list of suggestions that will help him teach each operation. He must study the list of operations and suggestions, not because he does not know them, but in order that he will not omit anything. We must bear in mind that there are many little things connected with making a mold that we are liable to consider too inconsequential to teach. This is wrong, for the more details we teach the more complete will be our work and the greater will be the knowledge the apprentice will have of the molding trade.

Mixing Gases for Industrial Use

Major Economies to Be Had Through Enriching Gases Too Lean to Be Used Alone— Modern Mixing Devices

BY JOSEPH F. SHADGEN*

IF competition is the life of trade, technical progress is the life of the productive end of all industries. To stand still is impossible in the modern race of progress and competition.

No industry realizes these obvious facts more than the iron and steel industry, where capital investments are large, turnover low and margins of profit often small. Success depends frequently on the ability to reduce manufacturing costs by taking advantage of every possibility in the complex technical processes.

Economies May Be Made in Fuels

Undoubtedly one of the most important opportunities to save money in the manufacture of iron and steel products is offered by fuel. Heat is applied in every step of the production from coke to pig iron, from bloom to wire, from slab to sheet. Heat applications are many fold, from the coke in the blast furnaces to the gaseous fuel in the open-hearth furnaces; from the tar or oil in the forge oven to the powdered coal in the pair furnaces; from the stokers in the boiler rooms to the electric heat in the refining and special alloy departments. The diversity of the item fuel is nothing short of amazing. B.t.u.'s today are no more restricted to one form; it means heat in a variety of forms—solid, powdered, liquid, gas (raw or refined)—and it is up to the practical engineer to utilize the most profitable form to best advantage, depending on supply and application.

Industrial gaseous fuels have taken a new importance during the past ten years, due to the realization of the above economic fact and all gaseous products of any process are looked upon as valuable assets. Coke oven gas, for instance, is no longer a by-product of the coking of coals, but one of the main products, on a par with the coke itself as well as the tar compounds. Blast furnace gas is no longer a waste product; it is a positive source of revenue to the ore reduction process, with definite market value similar to the pig iron and the slag.

New Era Calls for Mixed Gases

Utilization of the industrial gases has made rapid strides and the broader aspects of modern heat economy demand further developments. This second phase ushered the art of mixing gases into the picture. To date all gases are used "as is," and their applications are subordinated to their own characteristics. Gas mixing devices are invented and perfected to blend the available gases into mixtures which are more economical, which have superior characteristics and give greater heat efficiency.

This vision of the advantages of the art of mixing industrial gases opened new possibilities and a review of the foundation and developments of this new branch of engineering is most timely at this moment.

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The major industrial gases are: Blast furnace gas, producer gas, blue gas, coke oven gas and natural gas.

Five Industrial Gases Analyzed

Blast furnace gas is one result of the ore reduction process in the blast furnace. Enormous quantities are available; its density is about 0.08 lb. per cu. ft.; its heat content varies from 85 to 105 B.t.u. per cu. ft. Typical dry analysis gives $CO_2 = 12.5$ per cent, $CO = 25.4$ per cent, $H_2 = 3.5$ per cent, $N_2 = 58.6$ per cent. It requires about 1 cu. ft. of air to burn 1 cu. ft. of gas with no excess air. To date blast furnace gas is mostly burned under boilers here in America. The tendency is to clean it to a greater degree and to use it as metallurgical fuel and it offers the greatest possibilities as a mixing agent to temper other richer gases.

Producer gas is made in producers by the incomplete combustion of coals or coke; it is the result of a transformation of dirty or unsuited solid fuel into refined and better suited gaseous product. Its density is about 0.065 to 0.070; its heat content varies between 135 and 165 B.t.u. per cu. ft. Typical dry analysis reads about $CO = 20$ to 30 per cent, $CO_2 = 1.5$ to 6 per cent, $H_2 = 10$ to 12.5 per cent, $N_2 = 52$ to 58 per cent. Its composition varies with coal used and method of running producer; it is not clean and should be used immediately. Cold, clean producer plants offer a difficult problem. Theoretical air required for complete combustion is 1.5 to 2 cu. ft. per cu. ft. of gas. Producer gas is used largely in open-hearth furnaces in the hot, raw state and it offers through high preheat the realization of very high flame temperatures.

Coke oven gas is the result of the high-temperature carbonization of bituminous coal mixtures in modern by-product coke ovens. Its density is about 0.4 to 0.5 lb. per cu. ft.; its B.t.u. content about 450 to 550 per cu. ft. and it required 4 to 5 times volumes of air for theoretical combustion. It is considered a rich, concentrated fuel, cleaned for wide and easy transportation. Its analysis varies with coking time and the following limits are averages: $H_2 = 50$ to 55, $CH_4 = 25$ to 30 per cent, $C_2H_2 = 2$ to 3 per cent, $CO = 6$ to 8 per cent, $CO_2 = 0.5$ to 2.5 per cent, $N_2 = 9$ to 12 per cent.

Advantage Offered by Blue Gas

Blue gas or water gas is, strictly speaking a product of the commercial gas industry, made from coke or coke residues (lately also from a mixture of coals) in so-called water-gas sets, with periodic cycles of air and steam injection. Blue gas weighs about 0.043 lb. per cu. ft. Its heat content varies between 290 and 310 B.t.u. per cu. ft.; it requires about three times its volume of air and its typical analysis reads $H_2 = 50$ per cent, $CO = 42$ per cent, $CO_2 = 3.5$ per cent, $N_2 = 4.5$ per cent.

Blue gas offers remarkable possibilities. It is a medium gas, neither rich nor poor. It is cheap to make, as a study of the cost figures of the gas industry will prove

conclusively; its method of manufacture is flexible. It offers great opportunities in the mixing of gases, either to "lengthen" rich gases such as natural gas or coke oven gas, or to blend producer gas and blast furnace gas into richer mixtures. Attention is here drawn to the possibilities of this gas in the iron and steel industry. It is often more profitable to make blue gas with coke breeze than to burn that residue in stokers under boilers.

Natural gas is, of course, the peer of all industrial gases; it was made in nature's laboratory in the centuries of the Dark Ages. Density = 0.046 lb. per cu. ft. Composition H_2 = 2 per cent, CH_4 = 93 per cent, N_2 = 3.5 per cent, CO = 0.5 per cent, C_2H_4 = 1 per cent. Its B.t.u. content is about 950 to 1100 per cu. ft. and the air required is 9 to 11 times its volume. Its composition changes often hourly and depends largely on source of origin and distribution system. Natural gas is a rich, clean fuel. Economically speaking, it has only one drawback: it is too good. The art of gas mixing tries to correct that property by creating more suitable mixtures with lean gases.

It certainly stands to reason that natural gas is not the ideal fuel for low-temperature operations. It is too concentrated for that purpose. To burn a 1000 B.t.u. valuable gas where a 350 B.t.u. gas would fit the bill is simply extravagant and offers a possibility for saving.

Gas-Mixing Devices Being Developed

This can be done by a suitable gas-mixing device which offers attractive investment returns. All over the country engineers are realizing the truth of the above facts and mixing stations are operating to enrich blast furnace gas with coke oven gas; to lengthen natural gas with blue gas; to temper natural gas with coke oven gas; to mix producer gas and blast furnace gas, etc., etc.

A large variety of combinations are possible and engineers interested should make comparative studies of gas and gas mixtures, with computations of heat capacities, flame temperature, pyrometric factors and colorific intensities. In the books covering the subject, such as Trinks, Williams, Groume-Grjimailo, Pratt, etc., valuable information is available and the pamphlets of the American Gas Association are full of data and instructive suggestions. Table I shows interesting comparisons.

The practical problem of mixing gases consists of the development of reliable mixing and control apparatus. It is, strictly speaking, a control problem. Two gases have to be brought together in the right amounts and in the correct proportions to produce a definite mixture of predetermined B.t.u. content per cu. ft. Outstanding features of any gas-mixing device are: Range, Ratio and B.t.u. correction.

Range—The mixing apparatus must deliver the gas mixture as needed in the quantities as demanded by the furnaces or other consumers. The mixture may not be right, but the gas quantity needed must be supplied, so as not to interfere with production. Therefore, it is essential to base the operation of the mixing and control devices on the quantities delivered, which means flow control. Flow (cu. ft.) of gas *A* plus flow of gas *B* gives flow of mixture *M* is the foundation.

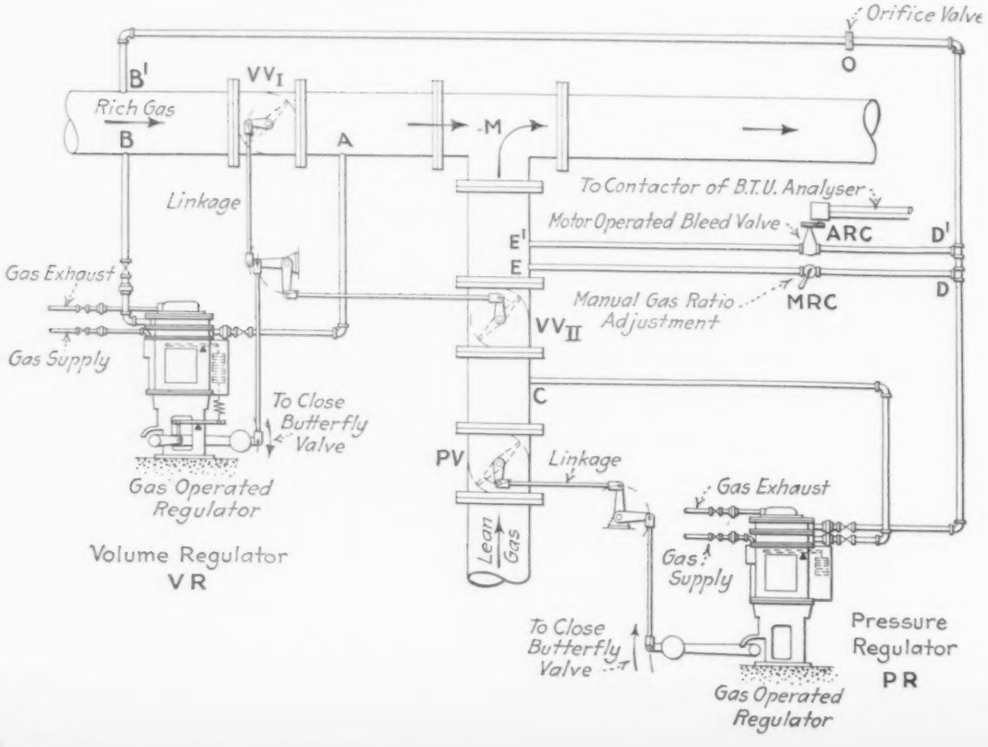
Flow control means measuring the volumes and correcting the quantities as needed through accurate flow metering devices. The range determines the limits of accuracy. Practical considerations such as multiplicity of furnaces, Sunday banking, etc., require wide limits, such as 10 to 1, meaning 150,000 to 15,000 cu. ft. an hour, or 63,000 to 6300 cu. ft. an hour. The flow control must be accurate and it must be flexible, to follow rapid changes, such as the sudden shutdown of one furnace unit. Reliability, this last specification, is obvious, but is often a severe task on account of the climatic considerations of outdoor service.

Proportioning for Desired Analysis

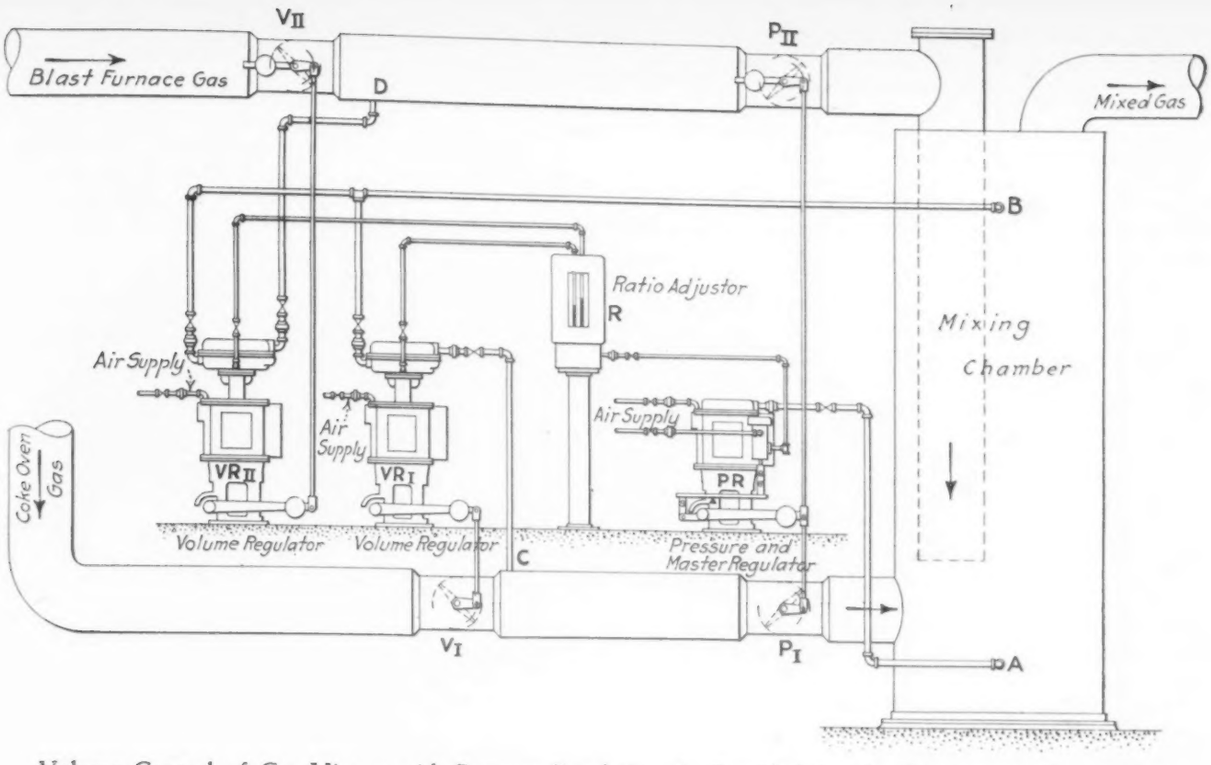
Ratio—A definite proportion between gas quantities gives the right analysis to the mixture. That is, expressed by

$$\frac{\text{Volume A}}{\text{Volume B}} = \frac{2}{1} \text{ or } \frac{3}{4} \text{ or } \frac{1}{5},$$

as the case may be. This can also be written 1 Volume *A* for 2 Volumes *B*, or 4 Volumes *A* for 3 Volumes *B*, or 5 Volumes *A* for 1 Volume *B*. A third method of express-



VOLUME Control of Gas Mixture With B.t.u. Correction Is Had by Use of the Layout Here Pictured



Volume Control of Gas Mixture with Pressure Regulation Is Provided by the Equipment Shown Here, Wherein the Two Gases Meet at Right Angle in the Mixing Chamber

ing ratio is in form of percentage of mixture, such as 100 per cent Mix = 33 per cent *A* plus 67 per cent *B*; 100 per cent Mix = 57 per cent *A* plus 43 per cent *B*; 100 per cent Mix = 83 per cent *A* plus 17 per cent *B*.

Once the metallurgical calculations have decided what mixture is best suited, the ratio can be determined approximately and the control device must give those proportions between limits. For instance, a mixture of coke oven gas (500 B.t.u.) with blast furnace gas (100 B.t.u.) is desired to have 340 B.t.u. content per cu. ft. That requires 3 volumes of coke oven gas and 2 volumes of blast furnace gas, a ratio of 3 to 2, or 60 per cent of coke oven gas to 40 per cent blast furnace gas.

The control device must allow the setting of 3 to 2 ratios between limits of 3.5 to 1.5 and 2.5 to 2.5 (70 to 30 per cent and 50 to 50 per cent), corresponding to 380 B.t.u. upper limit and 300 B.t.u. lower limit of mixture. These ratio calculations are very important to determine the accuracy of the control device. The settings must not only be simple and easy to make, but also permit rapid checking.

B.t.u. Correction—For ordinary industrial gas mixing purposes the problem is solved by accurate flow control (quantity) and accurate ratio (quality), but there is often a necessity to go a step further. This condition exists, for instance, with a gas company which is bound by contract to deliver a definite B.t.u. gas to a community for general distribution. As none of the constituent gas has a definite, fixed analysis, corrective devices based on the measured B.t.u. content of the delivered mixture is necessary.

This is a slow, gradual, small, micrometric adjustment of the ratio and is operated similar to a vernier attachment on a rough, approximate setting. The B.t.u. metering is by necessity slow; it takes time to meter continuously and accurately the B.t.u. content of a gas; the instruments accomplishing this are bulky, sensitive and very slow, as they must correct for all variables (temperatures, pressures, altitude, flow, etc.) to be of real commercial value.

Table I—Qualities of Industrial Gases

	Blast Furnace Gas	Producer Gas	Blue Gas	Coke Oven Gas	Natural Gas
Flame temperature with theoretical air, deg. Fahr.	2350	3000	3500	3400	3350
B.t.u. per cu. ft.	95	165	295	475	950
Air required, volumes	0.75	1.35	1.90	4.5	9.5
Cu. ft. of mixture	1.75	2.35	2.90	5.5	10.5
B.t.u. factor of unit mix	56	70	100	87	91

Limitations of B.T.U. Measurement

Attention is drawn here to the fact that B.t.u. measurement cannot give practical results when used as a primary control function. In operation this solution is very sluggish and entirely too lazy. Volumetric changes pass by unnoticed and ratio adjustments take hours to make.

Controls based on temperature characteristics of the flames are also unsatisfactory, for similar reasons. They are further complicated by the fact that the same pyrometric effect can be secured by various component basic gases present in the gases to be mixed. The above engineering analysis can be summarized by saying: A successful and practical gas mixing apparatus must be based on flow control of the constituent gases, must permit accurate measurement of the gas flow between large limits, must allow ratio settings to change the relative proportion of the gases to be mixed, within definite limits, and the whole device must be so designed to permit the incorporation of a B.t.u. correction, either by machine or by hand.

Two years ago the Smoot Engineering Corporation, New York, having at its disposal a long, specialized experience in control problems, such as combustion control of boilers, flow control of water-gas sets and general design of governors for industrial purposes, set out to study the gas mixing problem along the lines outlined above. The first solutions tried in an Eastern steel plant had too

narrow an operating range (4 to 1). In 1928 a second solution was developed, which satisfied the customers and has a commercial accuracy between the limits of 10 to 1 or 12 to 1. On page 221 is a diagram of the Smoot control of volumes, combined with pressure regulation.

The two component gases are mixed in a tank. Through turbulence created by changes in direction, combined with a right-angle impingement of the two gases, the mixture has proved to be very complete. It was desired to maintain a definite pressure in the tank, to allow easy setting at the burners of the nearby furnaces.

Pressure in the tank was used as a criterion to measure input quantities against outflow of mixture. A pressure or master regulator *PR* was installed to operate valves V_I and V_{II} in the line of component gases in such manner as to maintain the pressure at point *A* within definite limits (10-in. water pressure ± 0.1 in.). The volume regulators VR_I and VR_{II} measure the volume of each component gas through the drop in pressures between points *B* and *C* and *B* and *D* respectively. They operate the valves V_I or V_{II} in such a way as to maintain definite relationship between the volumes delivered.

This ratio can be adjusted by the indicator *R* and is visible through mercury columns. The regulators shown are air operated, and are reliable, simple machines suited for outdoor service. The success of this solution has been graphically illustrated by charts, and the plant operators have expressed their satisfaction in several repeat orders.

On page 220 is a diagram of a simple volumetric mixing device secured with two regulators. A volume regulator VR operates two volume valves VV_{II} and VV_I in such manner as to maintain a definite pressure drop between *B* and *A* through VV_I. To do that at low flow the valves must be nearly closed and at full load pretty wide open.

To make sure that the ratio between gases I and II is maintained, a second pressure regulator *PR* giggles the butterfly *PV* in such way as to maintain a predetermined relationship between *B'* and *C*. Then the drops *B'M* and *CM* are proportional to the volumes delivered. The handcock *MRC* permits a change in ratio by bleeding from *D* to *E* and lowering the pressure operating on regulator *PR*. This can also be done by B.t.u. corrector adjusting the cock *ARC*, which controls the bleed-off from point *D'* to *E'*. The orifice plate *O* controls the rapidity of these changes.

Choice of the regulator depends on local conditions. The regulators shown are gas operated. Oil-operated governors are supplied wherever responsibilities are large and reliability of operation absolutely required. The nature of the regulators is independent of the basic principles of the mixing system, and is merely a means to execute the orders given to the sensitive diaphragms and metering devices. Several installations of this solution are operating successfully in steel plants and gas plants on the Atlantic seaboard.

Better Utilization of Fuels

These developments are, however, of broader significance. They are the result of the insistent demand of progress. One large company reports having used, through a mixing apparatus, millions of cubic feet of blast furnace gas as fuel replacement of coal and richer gases in rolling mill and forge furnaces. Savings up to $20,000 a month have been realized. The investment value of several mixing devices installed figures out to be 300 per cent a year, which is quite unusual.

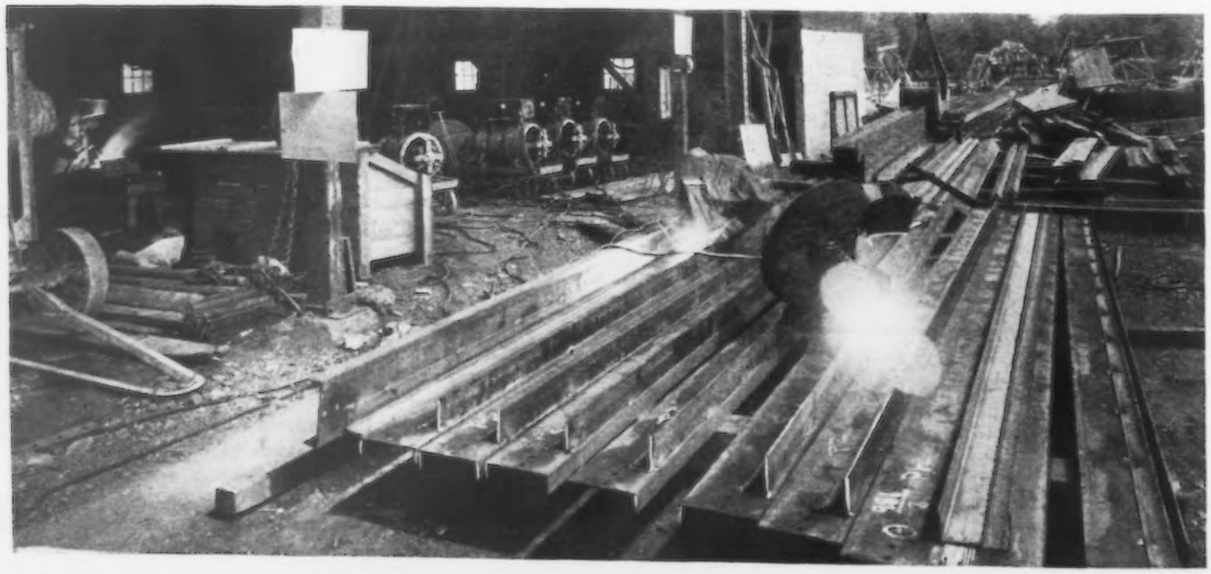
This new field of engineering promises to furnish an important contribution to the better utilization of the fuels in the whole iron and steel industry, and to the conservation of natural resources.

Fabricates Welded Structural Frame with Simple Equipment

FOR a 100 x 200-ft. addition to the plant of Lincoln Electric Co., Cleveland, the Austin Co., Cleveland, which designed and erected the structure, used electric welding for the joints, bolts being used merely for assembly and erection purposes.

Roof trusses are 67 ft. long. Chords are of T section, formed by splitting 15-in. H beams down the center of the web. Diagonal truss members are angles in pairs, back to back, temporarily bolted and then welded directly to the web of the chord member, without gusset plates. Columns and crane girders are of H beams; a heavy truss in the plane of the side walls was necessary to carry the roof and craneway over two railroad sidings. This truss was also welded at all joints and at the end connections.

Rapid and economical erection was a result of using a sufficient number of field bolts to hold the members in correct position until the welding could be done.



Impressions of Tokio Congress

Japanese Showed Unusual Capacity to Promote World Engineering Meeting and to Entertain in Face of Language and Other Obstacles

BY DR. LILLIAN M. GILBRETH

A WORLD engineering congress, such as the one convened late in October in Tokio, Japan, means a long period of planning for many people. The Japanese representatives traveled over the world, meeting leaders in engineering everywhere, and getting advice and cooperation. The product of this was a well-articulated, significant program, the attendance of distinguished engineers as delegates, chairmen and writers of papers, and the determination of the most acceptable and efficient time, place and procedure for the meetings.

The Japanese organizers were from the top rank of the profession; they made their first contacts at the top. In the United States, President Hoover himself approved and promised to cooperate, but the rank and file of the profession everywhere were enlisted in the project, as an opportunity to participate in an international undertaking, to establish friendliness and interchange of ideas among engineers.

An engineer specializing in efficiency of course was deeply interested in the methods and devices of running the congress. I should rate them extremely high. The Japanese group had done a difficult job well. The usual squad of reporters and photographers, who came out to meet us with "impressions" and "once mores," took less time and effort than is usual, and showed the model consideration and courtesy that was evident in every Japanese of every group, all through our stay in the country.



A JAPANESE photograph of Mrs. Frank B. Gilbreth, The Iron Age's special correspondent to the World Engineering Congress. Dr. Gilbreth is president of Frank B. Gilbreth, Inc., Montclair, N. J., specializing in developing methods and devices of motion and fatigue study. She is carrying on the pioneering engineering practice directed until his death in 1924 by Mr. Gilbreth, with whom she had been collaborating professionally for some years. She has degrees from the University of California and Brown University, is a member of some six professional societies and is the mother of eleven children

Delegates Given Explicit Directions

We made some contacts with our international group during the day, as we met at the Parliament House for registration. In this building was handled the management of both the World Engineering Congress and the World Power Congress. The routing of the congress group from hotels to this building was well handled. A fleet of guest automobiles was at the Imperial Hotel all through the congress. And those who were at Yokohama had special cars and trains. Railroad and tram passes assured free transportation.

At the Parliament House were arrows, signs, interpreters, Boy Scouts—every known means for ease of location. Graphic representation, colors, badges—nothing was left unused. As a result, by Monday night only the negligent were left without badges, programs, schedules, tickets for everything (including excursions and trips all over Japan). In fact, full plans and specifications.

The World Power Congress succeeded in putting information as to date, day, time, section, location of section, subject, chairman, vice-chairman, general reporter, technical secretary on one schedule, on a 16 x 16-in. sheet, with some supplementary information in Japanese.

The World Engineering Congress sheet, of identical size, covered date, day and social as well as technical events, but left all but mention of meetings to the supplementary booklets. In short, the maximum of planning, visualizing of consecutive and simultaneous events and relation of used to idle time was done.

What Happened at Opening Sessions

The president's reception Monday evening, Oct. 28, was the first opportunity to get the "feel" of the whole congress group. The first impression was one of differences—between hosts and guests (this is usually true in international congresses). The second was, how superficial these are, as compared with fundamental likenesses of aims, interests and experiences.

The disadvantages of differences in language became apparent, which was to be the chief obstacle all through our stay in Japan. Over against this there was the fact

that all engineers use the same technic; that many speak or understand the French, English and German that take one through any congress; and that the engineer's ability to express himself in sketches, formulas and graphs makes for a universal language. Most of us felt even that first evening that English, spoken slowly and distinctly, is becoming a universal language, and that an artificial language is not necessary, though perhaps useful and interesting.

The congress had its opening ceremony on Tuesday morning, at the Municipal Auditorium at Park Hibiya. Because of the great earthquake and fire, there was no grand historic building available, and one missed the pomp and beauty of the opening of the first World Congress of Scientific Management, for example, held in Prague in 1924. But one was impressed with the smoothness with which the thousands of delegates and guests were handled. There was no hurry, no confusion; everyone had been told what to do and where to go, and at the appointed time the crowd was seated, ready to begin.

Prince Chichibu, brother of the Emperor, who was patron; the Prime Minister, who was honorary president; and Baron Furuichi, the president, took their places quietly. One young and two older gentlemen, in morning coats, very modern in dress, and with the dignity of an ancient civilization in their manner.

One was impressed immediately with the successful integration of respect for tradition and fitness with respect for speed and efficiency. Door signs and arrows; a plant on the speaker's desk, and large, impressive chairs on the platform; sack coats and cutaways; flashlights and the click of still and moving picture cameras. The Prince, a model of serious, interested attention; the Prime Minister and the president, setting the tone of respect to him, yet vigilant that the business of the session be put through on time.

Baron Furuichi outlined the short industrial history of Japan; spoke of the contribution of the governments, of engineers, of favorable business conditions, and of the assistance of foreign countries. He enumerated the "400-plus papers," the "600-plus guests" from "20 countries"; stressed importance of research and of interrelating investigations. "There is no national boundary to science."

Dr. Sperry, speaking for the United States of America, opened the responses. He was followed by representatives of the European and Asiatic countries having delegates. One was impressed with the dignity of the speeches, their sincerity, simplicity, friendliness.

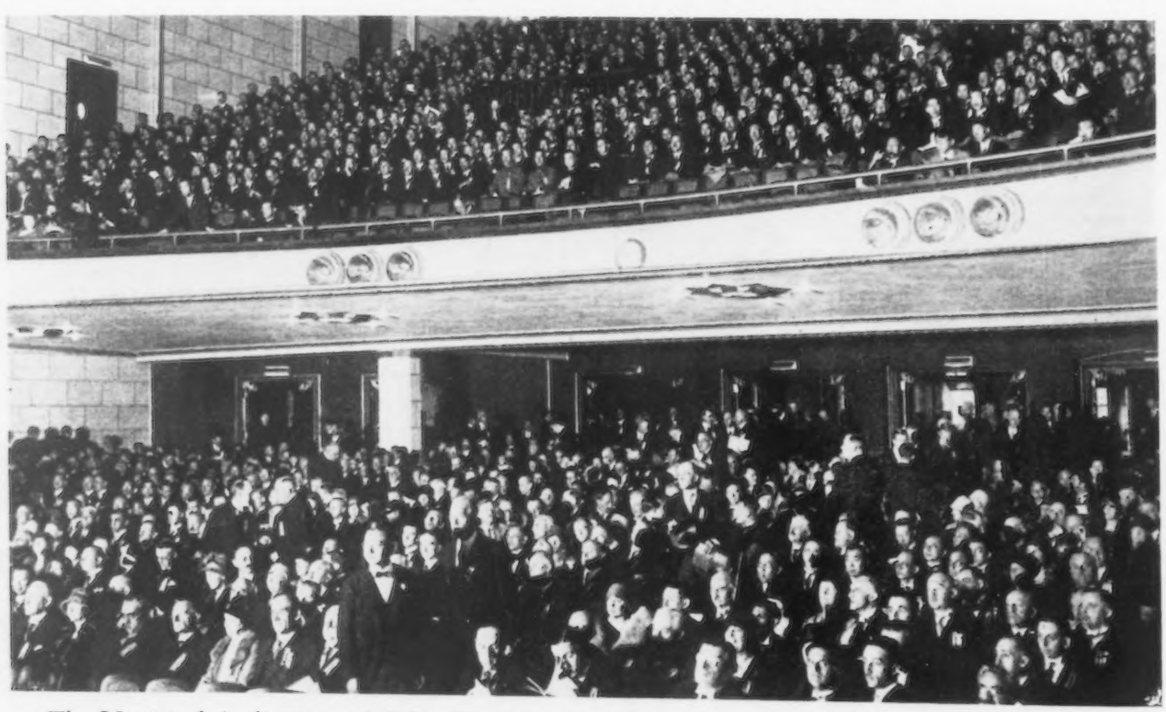
The chairman made his opening speech in Japanese; many of the English-speaking Japanese spoke Japanese throughout the congress. This seemed to me wise. They undoubtedly did themselves more credit than if they had used another language less skilfully; they carried their own countrymen comfortably along with them; they avoided translation of English to Japanese; they made the congress most educative to the 2400 of their people who attended, especially to the students in the group.

Chairmen of the sectional meetings were proposed and elected, this latter being done by hand-clapping. These had necessarily been selected beforehand, and confirmed by the national groups. The names were displayed on large sheets as read, thus appealing to the eyes as well as the ears of the audience.

Extra Congress Meetings Were Unusual

There were 12 sections to the congress. These met morning and afternoon Wednesday, Oct. 30, Thursday morning, Friday morning and afternoon, Monday morning and afternoon, Tuesday morning, Wednesday morning and afternoon. The first Thursday and the second Tuesday afternoon were left free for garden parties. That meant ten opportunities for sessions of sections; some sections used all ten; others needed less. All day of the second Thursday was reserved for closing ceremonies.

Apparently, there were from 700 to 800 overseas delegates, and about 2400 Japanese attended the technical meetings. It has been stated that there were 91 social affairs available.



The Municipal Auditorium of Tokio Was Taxed to Capacity for the General Session of the World Engineering Congress



Prince Chichibu of Japan, as Patron of the World Engineering Congress, Made an Address at the Opening Ceremony in the Municipal Auditorium of Tokio, Oct. 29, 1929

Japanese who were accustomed to and liked European dress, put on Japanese dress. The wives and daughters of the Japanese delegates participated in the entertainments, even the social dances. Both Japanese and foreign food was served, etc.

Many of us treasure most highly the times when we were welcomed to the home fireside, finding the "foreign style rooms" specially heated, tea foreign style, milk, sugar, cream and sandwiches—with hosts too busied about our comfort to sit or eat themselves. Hosts who had been busied not only attending, but preparing for and directing technical sessions and the social program of luncheons, dinners, excursions, garden parties, teas, dances, etc.

Activities Succeeding the Congress

The week succeeding the congress was devoted to excursions and to four "days"—like the Yokohama Day of the first week, when Nagoya, Kyoto, Osaka and Kobe acted as host. The entire congress group was invited to each, and every facility of the city was available. A typical day consisted of greetings of the municipality, inspection and sightseeing, luncheon and entertainment, more inspection and sightseeing, tea, dinner, entertainment, farewell. The "inspection" covered the business, industrial, educational and other institutions; the "sightseeing"—scenery, palaces, gardens—all the available beauty spots. In many cases opportunities were given us rarely enjoyed by Japanese or foreigners, as evidenced by the fact that many prominent Japanese informed us they had never had a chance to see things now opened for us.

The management of this week furnished a problem—the large group must be divided into smaller groups, which could be so handled that everyone could see everything, yet have free time to shop, accept personal invitations to lecture or be entertained, etc. When it is remembered that some of us fitted 20 lectures into the 30 days we were in Japan, with others asked for that could not be done, some idea of the complexity of the "time and effort" problem is given.

The ten days of Nov. 17 to 26 were provided for by excursions to more outlying parts of the Japanese Empire. Many went from these on to other parts of the Orient and to their homes. I spent this time at Tokio and Yokohama, trying to fit in the inspections I had missed while at technical sessions of the congress, visiting factories, department stores, offices, social service work, settlements, hospitals, colleges and schools—endeavoring to see as much as possible of the 24-hr. day of every member of the community, but especially of those in industry. I had every facility, but time was short, distances surprisingly great in spite of planning, expert guidance and every transportation facility. Farewell gifts were added to the many gifts already received—gifts from cities, industries, colleges or other groups to whom one had spoken, and from friends—flowers, tree trays, fruits, every lovely product of the country.

Steel Mill Expansion in Russia

SOME of the work being done in Russia by the engineers of the Freyn Engineering Co., Chicago, is reported by Gordon Fox, electrical engineer of that company. Some high spots of Mr. Fox's observations follow:

The present production of pig iron in the Ukraine district is about 3,000,000 tons a year. It is expected to double this tonnage, or more, within the next five years. Expansion in this general area is planned to require 15 new blast furnaces, several new steel works, both Bessemer and open-hearth, six or seven new blooming mills and a variety of finishing mills.

Owen Rice, metallurgical engineer of the company, reported upon a visit to a group of blast furnaces in the Ural district, on the border between Europe and Asia. Here in a square brick shaft built in 1753 he found a perfectly good cast of iron running with only 0.02 per cent sulphur. A pair of cast iron pipe stoves was in use. Blast was provided by means of an old water-wheel driving a line shaft connected by cranks to a battery of wooden blowing tubs with wood and leather valves. At the top of the furnace a group of women were charging with hand buggies.

Other features mentioned are a trough 40 ft. long and 8 ft. wide in which the cinder accumulates during the whole of the cast, later to be spooned out like taffy on the end of bars and loaded in horse-drawn wagons. There are seven blast furnaces here in a single line only 100 yd. long. They have cast iron tuyeres and elliptical shafts from hearth to hopper. Serving them, by way of contrast, is a brand new electrical-precipitating gas cleaner.

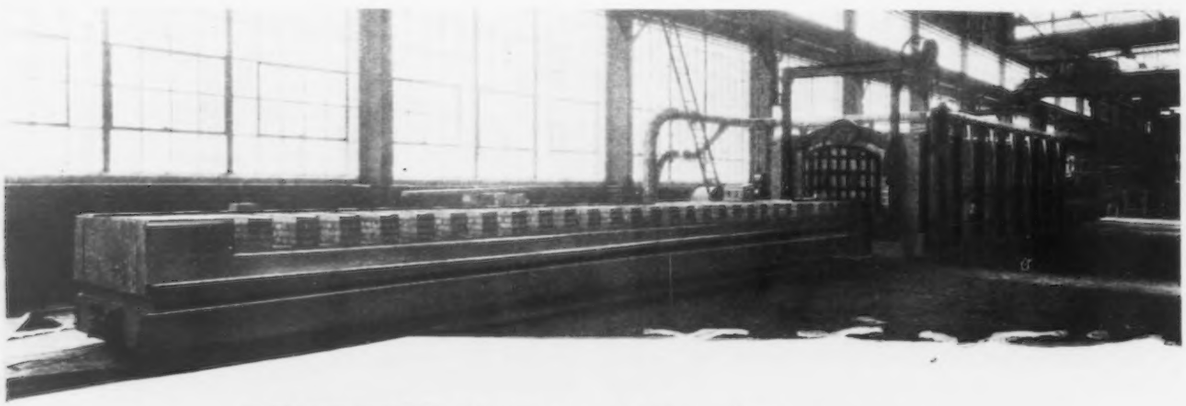
Alloy Steel Side Frames for Trucks

Superior for Withstanding Excess Strains—Types of Steel, Manufacture and Heat Treatment by Parish Pressed Steel Co.—Other Pressed Products

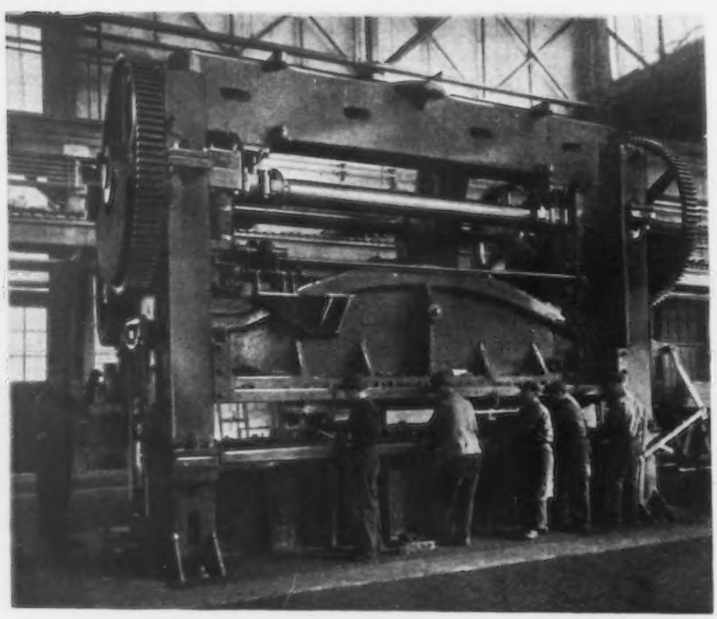
WITH the average life of a modern auto-bus or auto-truck about 500,000 to 600,000 miles, or 100,000 miles per year, something better than ordinary carbon steel, heat-treated or not, has been found necessary for side frames. In addition, the tendency to overload such vehicles, with an excessive strain on all supporting members, is common. It has been found that overloading alone has caused certain parts, such as frames of plain carbon steel, to be strained beyond the elastic limit and hence to be unfit for service before the end of the natural life of the bus or truck. In the case of the ordinary passenger car the average carbon frame usually lasts the life of the automobile.

A demand has therefore sprung up, as the weight of buses and trucks has increased, for a heat-treated alloy steel side frame for such vehicles. It is the claim of a large Pennsylvania pressed steel company that it has successfully solved the many difficult problems in making such frames and that its plant is the only one in the world where such frames are successfully made on a large scale. This company, the Parish Pressed Steel Co., Reading, Pa., says that not only must the steel itself be of unusually high grade, but also the forming presses and the method of forming as well as the heat treatment during processing must be carefully regulated. Special attention to the method of straightening is essential. Some of the features of the methods used by this company are outlined in this article.

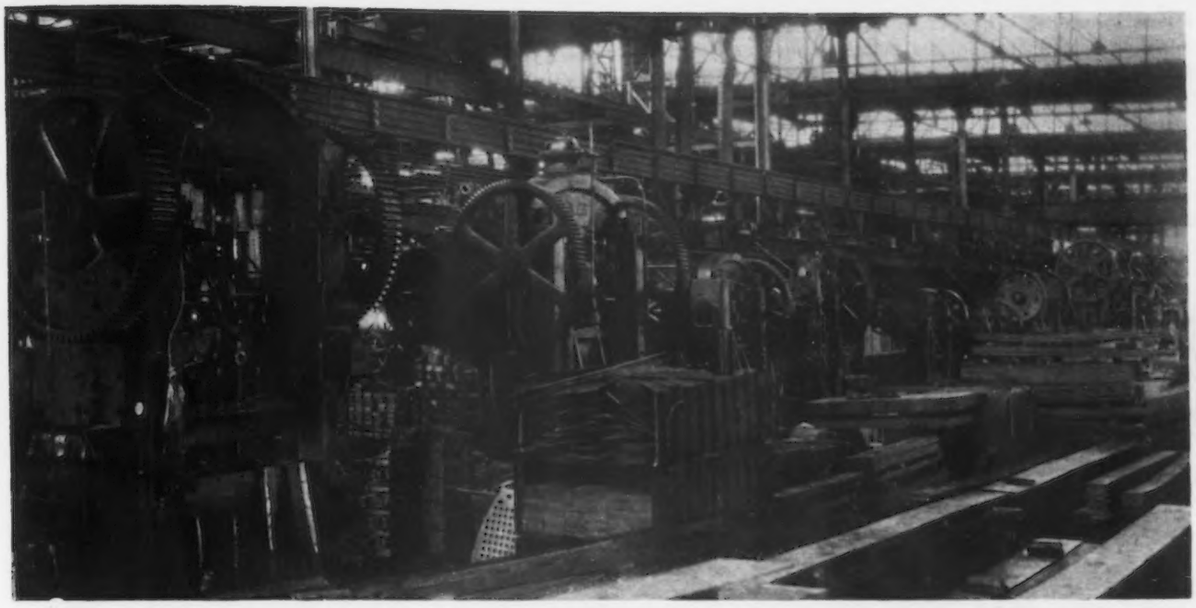
In the past, when the making of alloy steel frames has been attempted, it has been done by various plants in dif-



A LARGE 40-Ft. Annealing Furnace is Used for Treating the Sheets and Plates Before Forming (Above)



ONE of the Large Side Frame Blanking Presses (At Left)



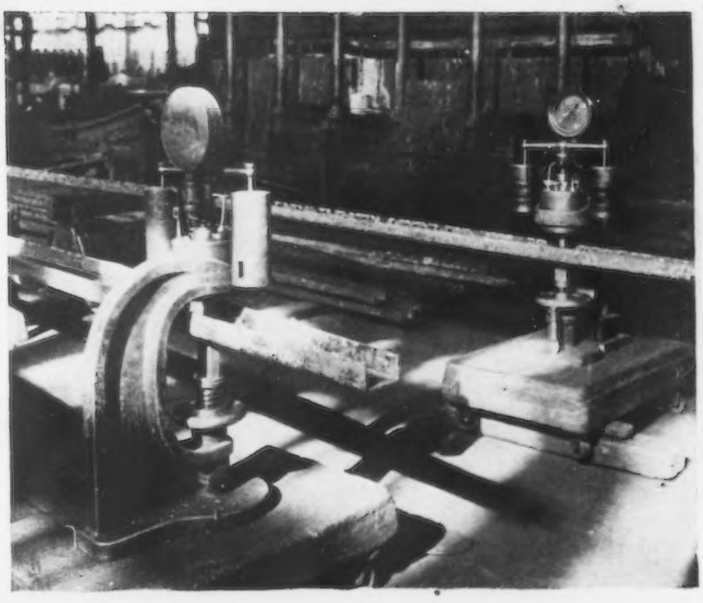
A FEW of the Many Power Forming Presses (Above)

* * *

SEVERAL Brinell Hardness Machines Measure the Hardness of the Frames After Heat Treatment (at Right)

* * *

SOME of the Special Straightening Machines Specially Designed for the Work (Below)

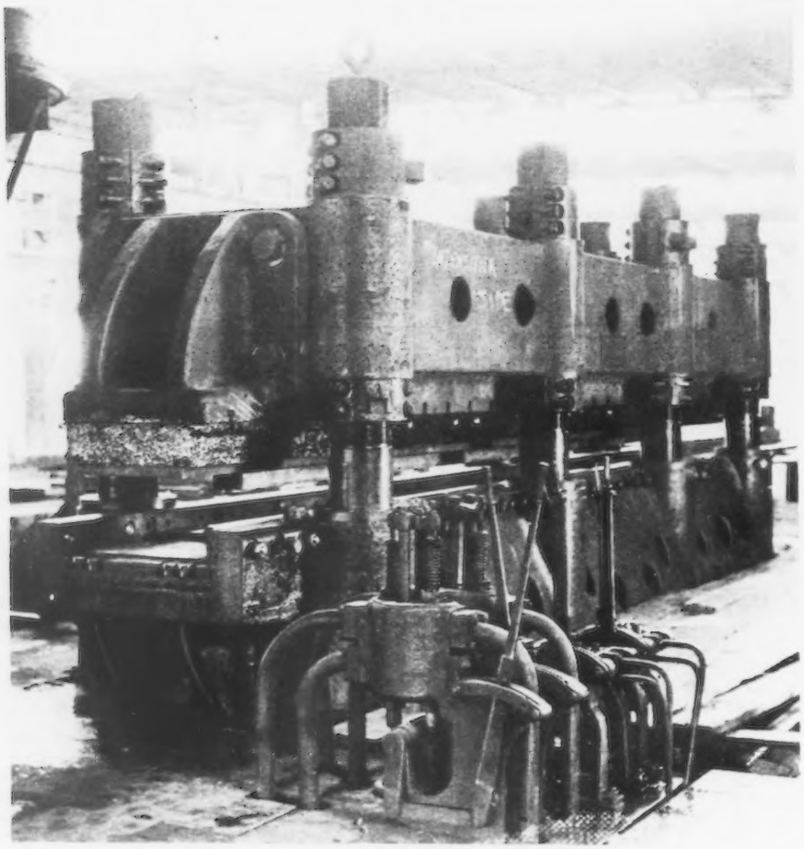




ferent locations. The Parish company's plant is an integrated unit where the raw material, such as plates and sheets, proceeds systematically under one roof to the finished product. About 80 per cent of the heavy-duty frames made in this country are produced by this company.

Three Types of Steel Used

In one corner of a building 800 ft. long, the raw material, plain carbon and alloy steel plates, comes in, three or four carloads at a time. The building itself has three bays, two of them 75 ft. wide and one 50 ft. wide, making the width 200 ft. The types of raw materials used are outlined in Table I.



This High-Powered Pneumatic Press Forms Some of the Larger Alloy Steel Side Rails

Large Furnaces for Heat Treatment

Only the alloy or high-carbon material is annealed and this is done before blanking. One large furnace is provided for this—one of the largest of the kind in existence. It is 40 ft. long, oil-fired, and is provided with two cars. One of them is being loaded while the other is being cooled and unloaded. One illustration shows this furnace.

The annealed sheets or plates are then transferred to the blanking presses or notching machines. Some of the former are very large and handle sections 30 ft. long. From this they go to the forming presses, of which there are two very large ones—one of 4000 tons, 30 ft. long, and the other 3300 tons, 25 ft. 6 in. long. Besides these two main presses for the larger frames there are some crank presses 28 ft. long. A new Hamilton press is being installed.

Most of the alloy steel frames have to be quenched and tempered and two large furnaces with oil-quenching tanks are provided for this. Both the quenching and the tempering furnaces are 40 ft. long. All furnaces are, of course, regulated by pyrometers.

Straightening the Frames Is Expensive

After the formed side frames are heat treated, they are sand blasted when necessary and then subjected to the most expensive step in the whole process—straightening. This is a difficult operation and it has become necessary for the Parish company to develop special machines and train expert men in this work. A battery of 15 machines, shown in one of the illustrations, takes care of this work. Drilling and assembling of the frames is the last step in the process.

One feature of the plant is the use of the waste heat of the quenching furnace for heating a boiler which supplies steam to a pickling department some distance from the furnace. All the low-carbon steel, incorporated in smaller frames, is pickled with this waste heat steam as a source of heat.

At one stage in the process, usually after heat treating and sand blasting, all of the heat-treated frames are subjected to a Brinell test. Some specifications require this. It is, however, used also by the company as a check on heat treatment. A product which for some reason is too hard is retreated.

Trend Toward Medium-Manganese Steel

One of the most interesting features is the trend to the use of medium-manganese steels in preference to other alloy steels. Table II gives the physical properties of the heat-treated frames made from the various raw materials.

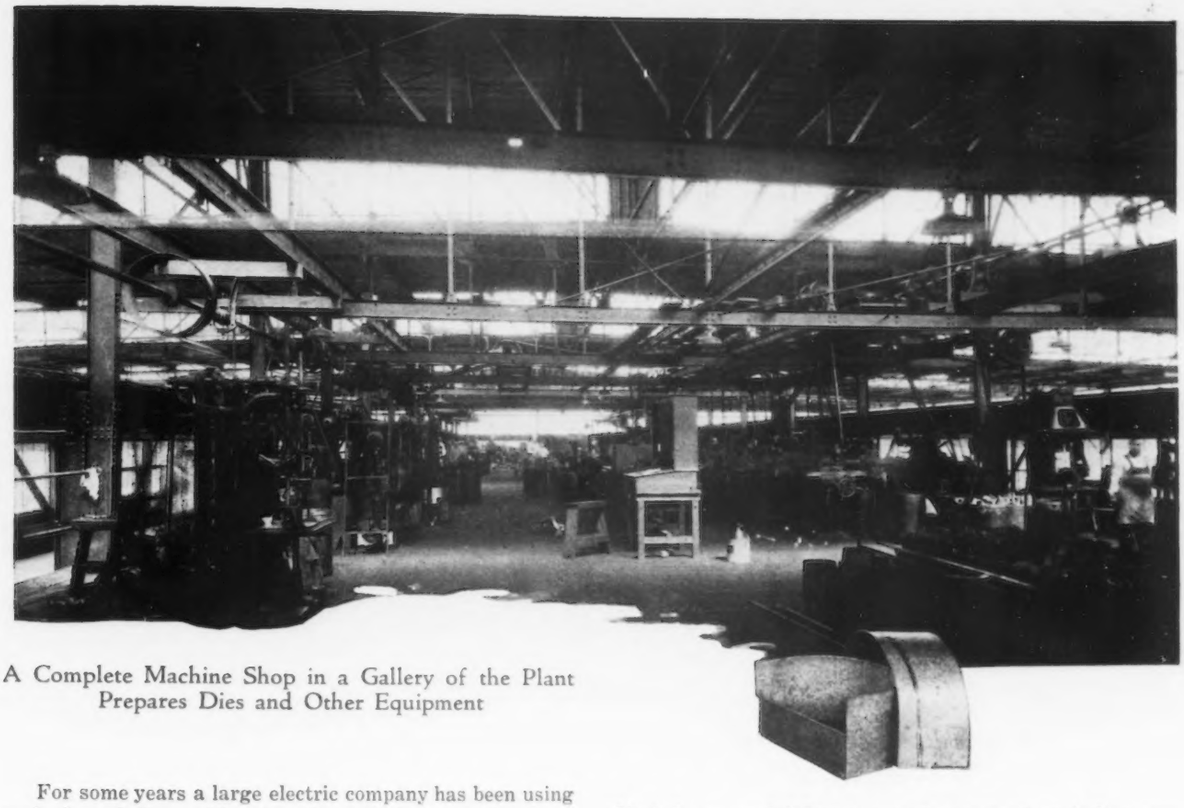
It will be seen from the data of physical properties that the manganese steel is superior to any of the others. A particularly high fatigue value is essential to insure the long life of such frames as well as a high elastic limit. This manganese steel has been found to meet such conditions. In some the elastic limit has run as high as 116,000 lb. per sq. in. with a tensile strength of 129,000 lb. It combines high hardness with high strength and elasticity, enabling it to meet the severe service encountered in bus and truck manipulation.

Table I—Classes of Steel Plates for Side Frames

	C	Mn	Cr	Ni	For
Plain carbon	0.18 to 0.25	0.40 to 0.55	.....	.....	Unheat-treated frames.
Plain carbon	0.22 to 0.32	0.40 to 0.55	.....	.....	Heat-treated frames.
Alloy steel	0.19 to 0.26	0.40 to 0.60	0.40 to 0.60	1.40 to 1.60	Heat-treated alloy frames.
Medium manganese	0.25 to 0.35	1.30 to 1.60	.....	.....	Heat-treated alloy frames.

Table II—Physical Properties of the Steel Used

	Elastic Limit, Lb. per Sq. In.	Tensile Strength, Lb. per Sq. In.	Elong. in 2 In., Per Cent	Red. of Area, Per Cent	Brinell
Chrome-nickel	90,000	100,000	36.0	45.0	.....
Medium manganese..	100,000	115,000	45.0	50.0	255–302
Carbon (heat-treated)	65,000	90,000	44.0	50.0	.....
Low carbon (unheat-treated)	40,000	62,000	65.0	50.0	131



A Complete Machine Shop in a Gallery of the Plant Prepares Dies and Other Equipment

For some years a large electric company has been using reels for winding cable wire, the reels being made of ordinary carbon steel. It has been found that the life of these has been short because of the ease with which the discs bend and get out of shape, causing damage to the wire and high maintenance cost due to replacements.

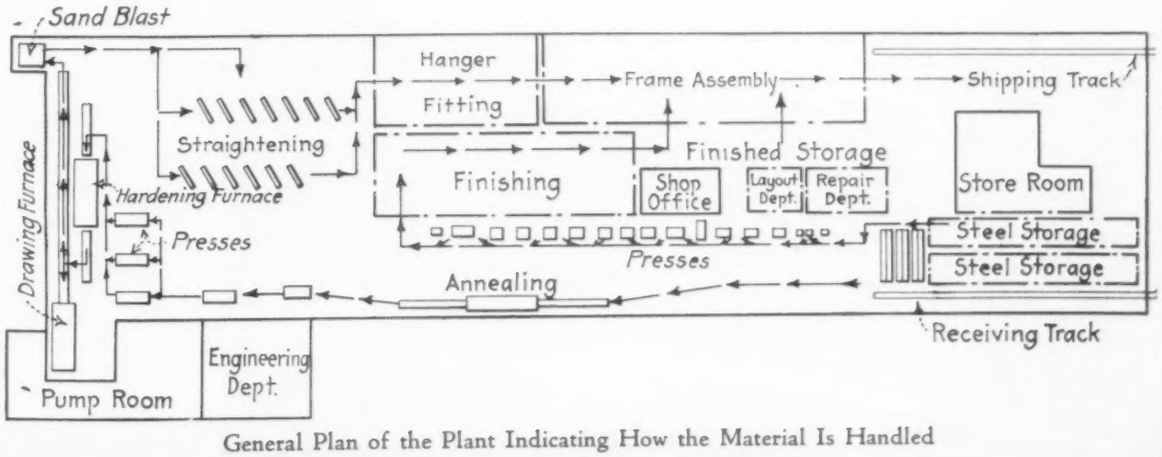
Because greater elasticity and toughness was necessary, a chrome-vanadium steel has been substituted containing 0.35 to 0.45 carbon, 0.50 to 0.80 manganese, 0.80 to 1.10 chromium and 0.15 to 0.20 per cent vanadium. These have proved satisfactory as manufactured by the Parish company. It is probable, however, that this heat-treated chrome-vanadium steel will be supplanted by the medium-manganese steel because of its relative superiority for such service and its relatively lower cost.

Other Pressed Alloy Steel Products

Among other interesting products made of pressed steel are axle flanges formerly made as drop forgings. Made by several different pressing operations before completion they have the advantage of having no draft and hence require less machining. These flanges are butt-welded to each end of an axle housing.

Other products include automobile spring supports and motor supports made of 3.50 per cent nickel steel heat-treated, and journal box lines for roller bearings on railroad trucks which are also heat-treated alloy steel products made of S.A.E. 5150, which are very hard, with some made of S.A.E. 1095.

It was interesting to learn that the experience of this company in attaining success in making these difficult heat-treated alloy steel frames, has proved that not only a very carefully made basic open-hearth steel is necessary, but that an acid steel cannot be worked easily or successfully in the forming presses where sections as long as 28 ft. are pressed into rather complicated shapes without cracking.



General Plan of the Plant Indicating How the Material Is Handled



Metal Wing Ribs Are Strong and Light

Moderate Sized Airplane Eliminates Wood in Fuselage and Wings, Thus Improving Production Schedules, Durability, Safety and Maintenance

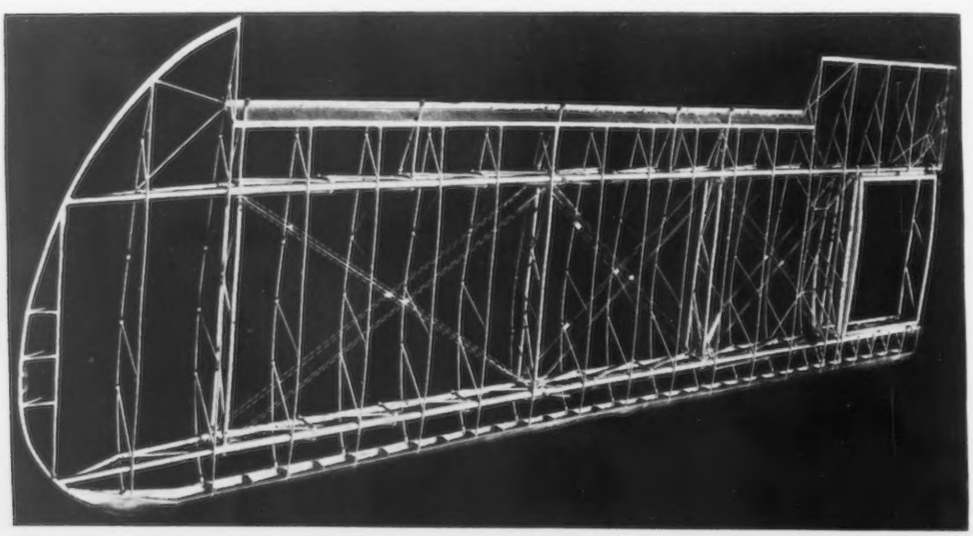
BY W. R. R. WINANS*

THE six-place cabin biplane produced by the Cunningham-Hall Aircraft Corporation, Rochester, N. Y., reflects the trend to the more extensive use of metal in airplane structures. It uses the conventional alloy steel tubing for fuselage skeleton, but is distinguished by wing beams and ribs made of duralumin tubing and by the fact that the forward part of the fuselage or cabin is covered with corrugated sheet duralumin.

In the fuselage, primary members are made of chrome-molybdenum steel tubes, with welded joints. To facilitate production the longerons are flattened at the joints, in special dies, thereby avoiding the necessity of cutting curved and bevel ends on the abutting members, and eliminating insert plates to prevent collapse of the tubes where heavy stresses are transmitted from intersecting members. This feature is shown at bottom of page 231.

The cabin is covered by corrugated duralumin sheet, heat treated, 0.016 in. thick. This adds considerably to the margin of strength of the structure, lessens crash and fire hazards, and provides an excellent wall for insulation and sound proofing purposes. The main cabin is exceptionally roomy and accommodates four people. The passengers may stand erect, changing seats in flight, with perfect ease; chairs are comfortably upholstered and correct in proportions to insure natural posture of occupants. A forward compartment, separate from the cabin, accommodates the pilot and one other person. The pilot's seat is adjustable, enabling the pilot to suit it to his stature or to change his position quickly while in flight. The second seat in the forward compartment is a folding one, and

*Secretary, Cunningham-Hall Aircraft Corporation, Rochester, N. Y.



GENERAL Assembly of Upper Wing Skeleton. Wing ribs are Warren trusses; main beams are double tubes trussed, and leading edge is duralumin sheet, heat treated

it drops below the floor when it is not being used.

Seats are made of sheet and tube duralumin, upholstered in leather harmonizing with the cabin trim.

An outstanding feature of the design is the all-metal wing structure. Wing ribs are Warren trusses, made of 3/8-in. duralumin tube, with 0.028-in. walls. A special type of riveted joint is employed, indicated in the close-up view of the leading edge of the wing. These ribs are exceptionally strong, in static tests sustaining over 1100 lb.

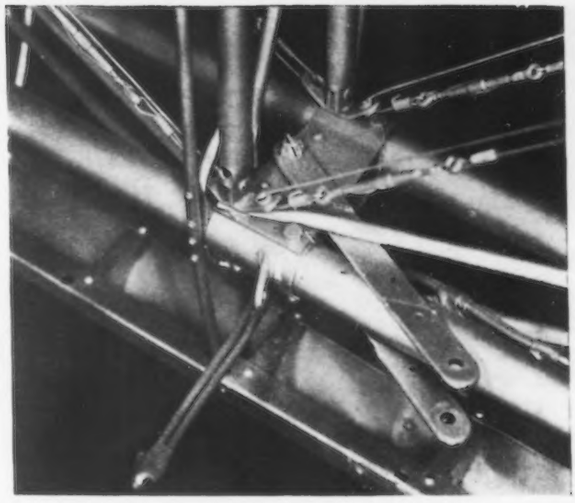
Beams in the upper wings are of the truss type, consisting of upper and lower longitudinals of chrome-molydenum steel tubes, 1½-in. diameter, 0.049-in. wall, heat treated to over 125,000 lb. per sq. in. tensile strength. The upper longitudinals are reinforced for a considerable distance at the outer support by similar 1 5/8-in. tubes, with 0.058-in. wall. The main longitudinal members of the wing beam are spaced by double vertical and diagonal members, as shown in the detail. Vertical members are spaced 16 in. apart. To avoid welding, distortion, and subsequent heat treatment, these vertical members and diagonals are bolted to the main longitudinals with 5/16-in. nickel steel bolts; 7/16-in. heavy tube spacers are employed to insure excess shear and bearing strength.

This type of construction is believed to be superior to welded joints, as it provides a very rigid beam and permits repair with ordinary tools. Compression struts are made of duralumin tube, 7/8-in. diameter, 0.057-in. wall, built into a shallow Warren truss. Aileron hinges are located at compression strut points and transfer aileron forces direct to the beam truss. The leading edge and aileron hinge beam are made of heat treated duralumin sheet.

Ribs for the lower wing are of the same design and material as the upper wing ribs. Beams are large diameter chrome-molybdenum steel tubes, heat treated.

Skeletons for the control surfaces—ailerons, stabilizers, fin and rudder—are all-metal structures. Ribs of these control surfaces are made of hard drawn No. 1025 carbon steel tubes; other minor members and fixtures are of the same grade of carbon steel tube and strip and chrome-molybdenum steel tube and strip.

Stick control is standard equipment. Push-pull rods of steel tubes, with nickel steel jaw bolts, machine bolts and pins, are used extensively in the control system. Aircraft steel cables and turnbuckles are also used in the control system. Cables run through individual aluminum tubes in the cabin walls, thus eliminating all possibility of fouling. Brake pedals, mounting brackets and fittings



DETAIL of Main Panel Point of Wing Truss at Leading Edge. Note riveted joints on wing ribs

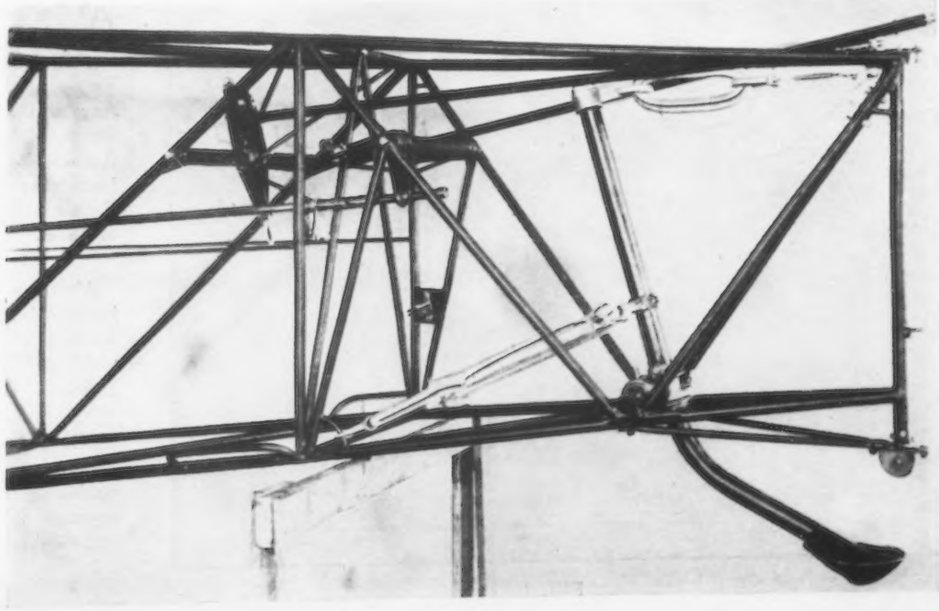
are high strength aluminum alloy castings. Bolts and pins subject to wear are chromium plated to prevent trouble in service due to the wear.

High standards and rigid specifications govern the selection of all materials. Physical and chemical reports are required from all sources of supply covering each lot of material. United States Army Air Corps specification materials are used throughout, and standard parts conform to the Army-Navy standards. The Cunningham-Hall six-place cabin airplane is powered with the Wright J-6 300 hp. engine.

High factors of safety have been secured in this design; at the same time the weight of the structure has been held at a low figure, as shown by the following general data:

Wing area: 378 sq. ft.
Weight empty: 2450 lb.
Weight fully loaded: 4000 lb. approx.
Pay load: 1000 lb.
Wing loading: 10.5 lb. per sq. ft.
Weight per horsepower: 12.5 lb.

Metal construction, as provided in this design, thus permits economical production and insures greater durability and safety, with lower maintenance, and greater accessibility for purposes of inspection and service.



REAR End of Fuselage Structure Showing Longerons Flattened at Panel Points

Makes Jigs and Fixtures by Welding

Westinghouse Plant Produces 200 to 400 a Month, Effecting Reductions in Time and Cost—Special Machines Also Built of Welded Steel

BY J. R. WEAVER*

APPLICATION of welding to the building of jigs, fixtures and machine tools was practically forced upon us about a year ago. At about that time our business increased very rapidly and it was necessary to obtain jigs, fixtures and special machine tools on short notice. On new machine tool purchases we found that delays in delivery were generally due to time necessary to make the jigs and fixtures. Naturally, the machine itself was more or less of a standard product and could be delivered in comparatively short time.

When it was proposed to manufacture jigs and fixtures from structural shapes welded together, several of these jigs were built and thoroughly tested to ascertain whether they would be suitable for our work. These jigs were tried for all inaccuracies that are liable to occur due to warpage, distortion, etc., and finally a definite program of manufacture was decided upon, with extremely satisfactory results. The thought was advanced that the welded jigs and fixtures would not maintain their shape after a period of time. But we have used them for about a year with less maintenance than with cast iron jigs.

Welding of Jigs Saves Time

We found that when putting orders through for cast jigs in the regular way about four weeks was required to obtain our castings. Of course, it was necessary to make patterns, core boxes, etc., and the castings had to be made, cleaned, etc. With the welded structure, we can obtain the most complicated jig in not more than one week's time and the average time is about four days. It will be readily appreciated what a decided advantage this is in manufacture of any kind of product.

These jigs are made from hot-rolled steel of whatever shapes and sizes are necessary. Where hardened pieces are required, tool steel is used and attached to the jigs by means of screws, bolts, etc., or in a case of bushings, pressed into holes provided for them. Some trouble was experienced with the feet on these jigs, this being due to the fact that after the jig was annealed these feet were so soft that chips on machine tools would imbed themselves in them. To overcome this, the feet are made from tool steel and heat treated before welding to the jig. They are drawn to a scleroscope hardness of 45 to 50 and can be machined. The results have been very satisfactory.

Tool Designers Trained in Welding Procedure

Our entire method of manufacturing jigs and fixtures had to be changed when we adopted the welded construction. This included not only actual manufacture of these jigs and fixtures in the shop but also the designing of them. To have the proper information on the drawings, it was necessary to train our tool designers in the art of welding to the extent that they could put the proper information on the sketches sent into the shop. In order to do this, we

*Superintendent, manufacturing equipment department, Westinghouse Electric & Mfg. Co., East Pittsburgh. From an address before a joint meeting of the machine-shop practice division of the American Society of Mechanical Engineers and the American Welding Society, at the Engineering Societies Building, New York, Jan. 7.

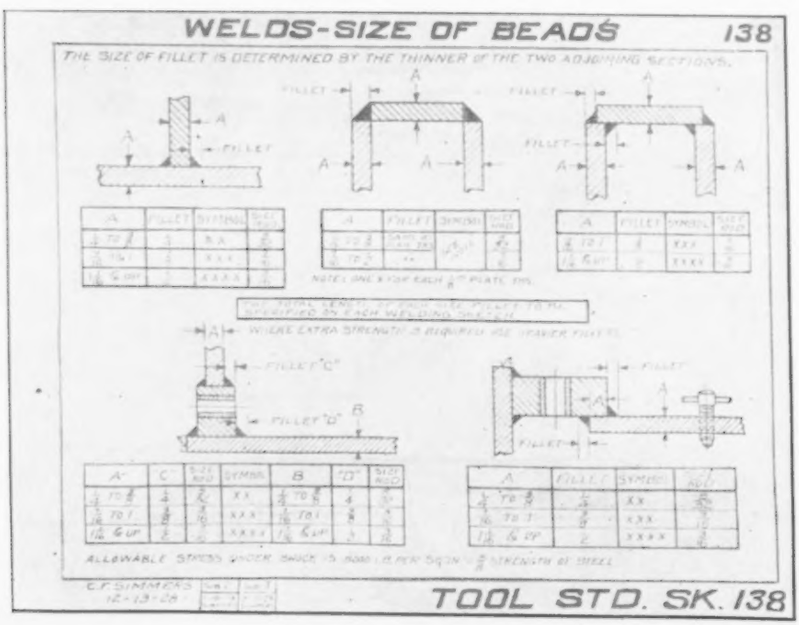


FIG. 1

AT Left, Fig 1, Is a Page from the Standards Book Dictating the Bead Size of Weld to Be Employed in Joining Metal in Any of the Five Basic Relations Shown. The boxed tables give the stock plate thicknesses used, identifying them by a series of *x*'s. Each *x* indicates a plate thickness of ⅛ in.

Above, at the right, Fig. 2, is illustrated the jig designer's first drawing of a milling fixture, in which no indication of welding is given.

Below, Fig. 3, is the second drawing, called the welding and machining sketch, to guide the operator in cutting, assembling and finishing

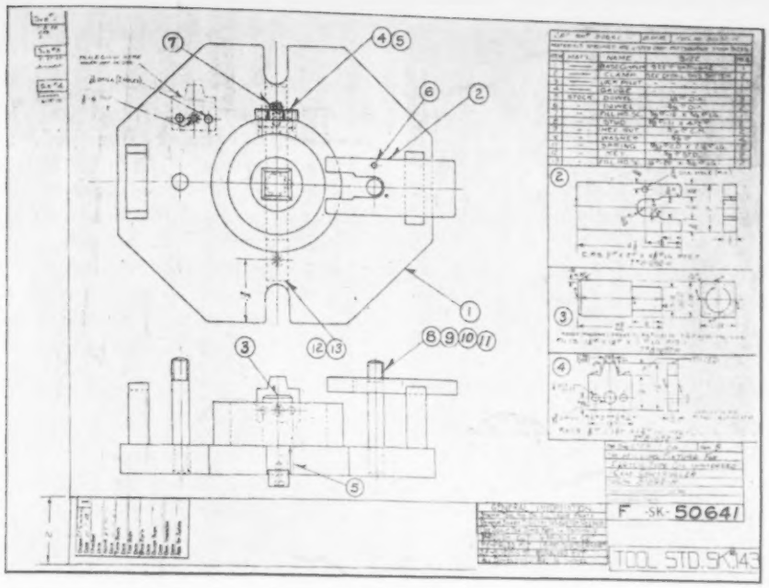


FIG. 2

incorporated in our standards book several sheets of instructions, which, in addition to supplying the workmen in the shop with information, also standardized the manufacture of welded jigs and fixtures.

The various types of welds and sizes of bead used on welded jigs and fixtures, adopted as standard throughout our shop, are shown in Fig. 1. To avoid delays due to material being out of stock, we also list in our standards book a sheet showing the stock sizes of steel being used for this particular method of manufacture. It gives the sizes of bar and plate stock. When bar stock is not suitable, the part is cut from a plate by means of an acetylene torch.

When the designer makes a drawing for a jig, he lays it out without showing any particular method of construction. Fig. 2 shows a milling fixture; one will note that no reference is made to welding in this sketch. Therefore, it is necessary for the tool designer to make a separate sketch, such as shown in Fig. 3, which is called a welding and machining sketch. This gives the detail construction and indicates what material is to be ordered and what shapes are needed. This material is then cut from the proper size stock, a saw being used on bar stock and an acetylene torch where plate is used. The parts are then assembled and welded together. The title of this sketch, it should be noted, indicates the total length of a given size weld necessary to completely weld this jig. This is done for the convenience of the time study supervisor, who estimates and sets a value on the time it should take to build the jig.

Welders Tested Periodically

Frequently the comment is made that it is not possible to test a weld without destroying it and that the workman must be relied upon for good workmanship. Realizing this, to control the quality of the welding we require the welders to stamp their work with a stencil. This serves to identify the welder who performed the work, and in case there is any question the work can be readily traced. Periodically we run a test on welds and if unsatisfactory welding is discovered the workman responsible for it is required to take additional instruction; if he proves entirely unsatisfactory, he is taken off the job.

How the Jigs Are Manufactured

One of the several cutting machines used for cutting the various parts from the stock required to make a jig is shown in Fig. 4. All the necessary large holes in the plates are cut by means of an acetylene torch before they are assembled into a jig. The various parts are assembled by a mechanic and tack welded sufficiently to hold them together. This is done by a mechanic to assure that the parts will be properly located, also so that the jig is squared up and is a good job when it is finally finished. After tack welding, the jig is passed to a welder who completes the job. Fig. 5 shows a jig tacked together ready for the welder.

A completely welded jig, which although fairly large weighs only 120 lb., is shown in Fig. 6. It is used for drilling the bracket shown at the right of the jig.

Internal strains due to the welding are removed by normalizing. This is done by heating the jigs in a furnace to a temperature of about 1000 deg. C., after which they are allowed to cool in the air. Due to the use of hot-rolled steel and the normalizing, a certain amount of scale is present, and this is removed by means of a sand blast machine. The appearance of the jig is greatly improved by the sand blasting operation. The jigs are then spray painted. They are sent to the shop for machining, which process is no different from that for a cast jig except that less material is allowed for finish.

Complicated Welded Steel Jigs Weighing 1300 Lb.

To give an idea of the extent to which we have gone in welding jigs and fixtures, in Fig. 7 a jig weighing 1300 lb., the overall dimensions being 39½ in. by 51½ in. by 21 in., is shown. This is a complicated jig and if cast would take considerable time both in the pattern shop and in the foundry. This jig is built entirely of steel, using hot-rolled bar stock and plates. The bosses shown in this

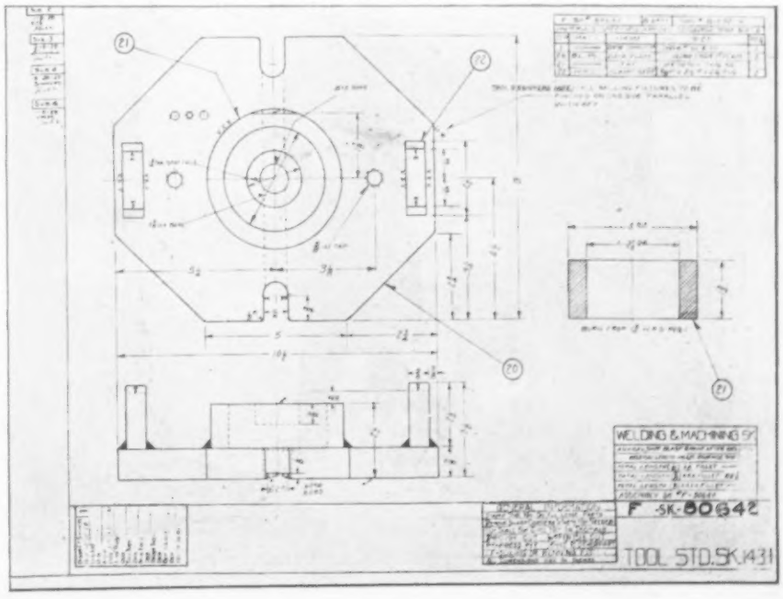


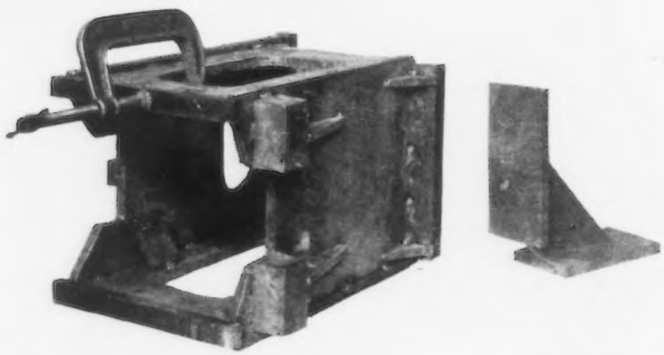
FIG. 3



FIG. 4. Plate Stock for Jig Parts Being Cut with an Oxyacetylene Torch. Below, Fig. 5. Jig After Tack Welding by a Good Mechanic, to Insure Accuracy. It is ready to go to the welder who will finish the work, by completing the fillets as indicated in the sketch from which he works

BELOW, Fig. 6 Shows Jig Used for Drilling the Piece at Right of the Picture, Completely Welded and Ready for Normalizing. Although large, this jig weighs only 120 lb.

The man in Fig. 7, at the bottom of the page, is shown beside a completely welded jig which weighs 1300 lb.



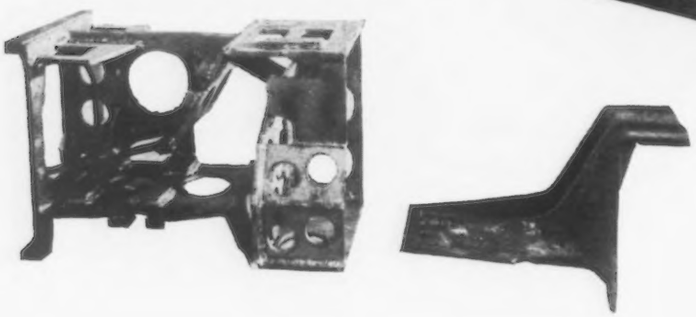


FIG. 10, Below, Shows Front and Rear View of a Large Jig. Note the reinforcing applied to the back



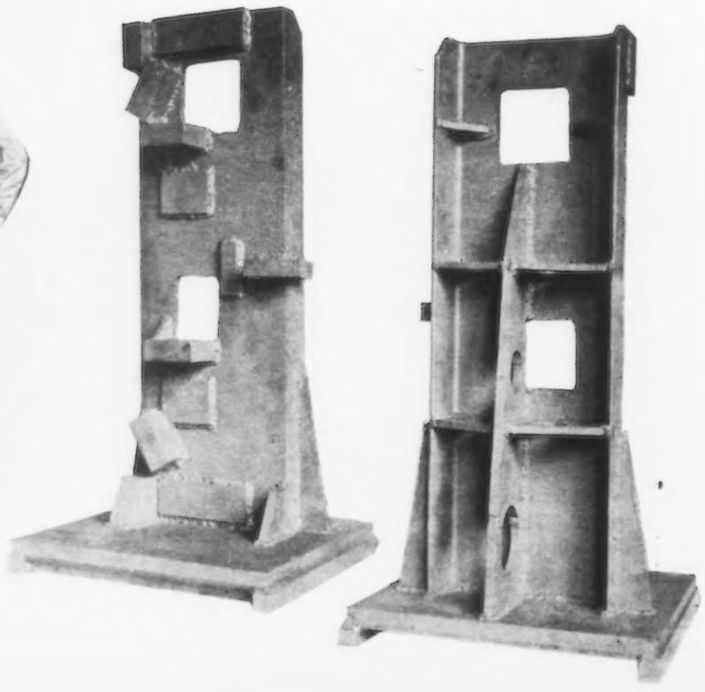
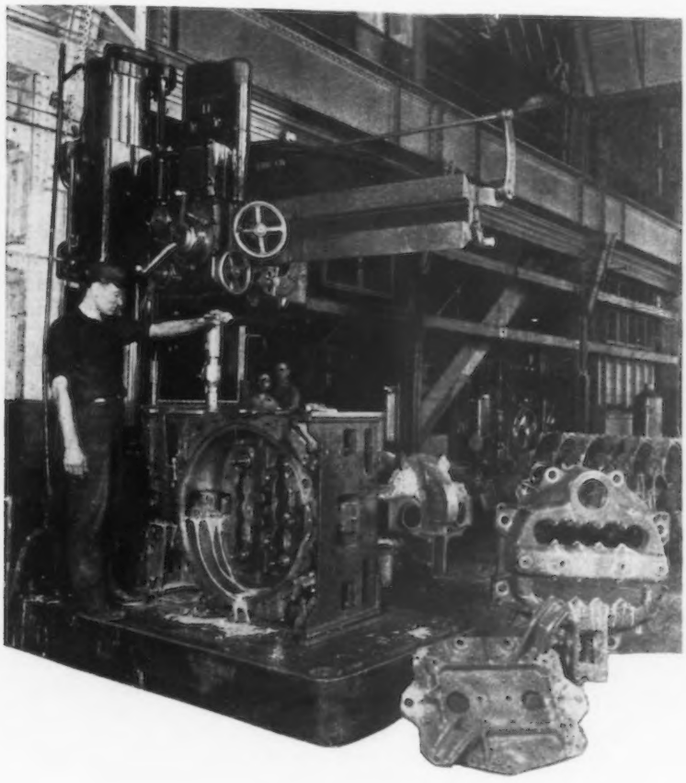
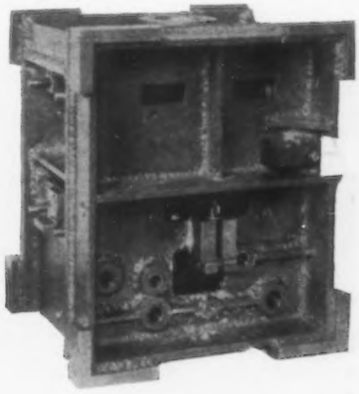


figure are made from hot-rolled rounds cut off with a saw and welded in place.

Fig. 8 shows a welded jig in use on a drill press. We have experienced no difficulty due to inaccuracies in these jigs, although we have been using them for approximately a year. Figs. 9 and 10 are among other types of jigs that we have manufactured. They indicate the feasibility of making any kind of a jig by this method.







AT the Left, Fig. 8, Is Shown a Welded Jig of Unusual Size Used on a Radial Drill. The casting for which this jig was designed is shown at the right of the machine. The welded jig in Fig. 9, above, is used for heavy boring. The piece bored is shown at the right

In addition to the advantages enumerated above, the welded steel jig is considerably stronger and lighter. It can be made from thinner material, and it is not necessary to increase the sections to reduce casting difficulties, etc. It is also possible to place metal where it is most desired in order to make a stronger jig with the least amount of weight. Further, in case a change in the jig is required, because of a change in the design produced, or for any other reason, it is very easy to remove any interference by means of an acetylene torch and reweld the parts in new locations.

Special Machinery of Welded Steel Construction

We have applied this method of construction to special machine tools which we design and build for our own use, and I believe it will be applied to many types of machines in the future. One machine that we build is a double-head oxy-acetylene cutting unit, and another, a machine for testing mica sheets. The latter is entirely of welded structural steel, with the exception of the worm gear reduction unit. A machine for winding mush type coils for a.c. motors is also fabricated entirely from structural steel and welded. This machine employs a tailstock somewhat similar to the general design of tailstocks, except that it is welded from structural steel. It functions satisfactorily and, although the requirements are not so rigid as in metal cutting, I do not see any reason why it could not be adapted satisfactorily.

Some further development would be necessary before this particular type of construction can be applied successfully to machine tool construction in general.

We are building from 200 to 400 welded jigs and from three to six special machines per month. I have been able to build these tools in shorter time, to reduce the average cost approximately 25 per cent, and to produce a jig and fixture that I believe is more desirable because it is lighter, and at the same time of at least equal strength. The jigs and fixtures which have been built in this way have also required less maintenance. I do not think we have sacrificed anything due to misalinement, warpage, distortion, vibration, etc., nor taken anything from the appearance on this particular type of equipment.

Tests Showing Skill of Aircraft Welders

Welders employed by the United States Army for making repairs on aircraft must pass definite qualification tests at regular intervals. Recently a dozen of these men at various Air Corps stations were asked to make six butt welds in the standard 0.75 in. by 0.030 in. chromium-molybdenum steel tubing. Half of these were tested in tension as received, and half with the reinforcement ground off.

Detailed figures were presented to the International Acetylene Association by J. B. Johnson, of McCook Field, Dayton, Ohio. The average of welds ground flush was 94,970 lb. per sq. in.; the average, with beads intact, was 93,975 lb. per sq. in. Only one test piece fell below the 80,000-lb. minimum specified in the qualification requirement—it broke outside the welded joint at 79,550 lb. per sq. in. Ultimate strengths varied from this figure to 120,100, and since all but seven of the 102 test pieces broke wholly outside the weld, the variation represents the degree of non-uniformity in the original tubing. Of those joints which broke wholly or partly in the weld, the strongest developed 108,300 lb. per sq. in.; the weakest 91,950 lb. per sq. in., and the average was 97,700 lb. per sq. in.

"What Is a Bronze"?

Term Is Used for Materials as Diverse as Copper-Tin Alloys, Red Brass, Powdered Aluminum and Shaft Bearings

ACCORDING to a letter circular (No. 268, dated June 24) of the United States Bureau of Standards, any alloy of copper and tin, containing 50 per cent or more copper and no other alloying metal besides tin, is a bronze. Outside of a very few alloys including certain bell metals, speculum metals or metals for special bronze files, the tin content is normally under 20 per cent.

The circular goes on to point out that there is very little use for such simple binary alloys. In fact, if one wishes to speak of an alloy of copper and tin alone, he will generally refer to it as a copper-tin alloy or else call it a tin bronze to make clear that he is referring to the simple binary alloy and not to any other alloy that has been termed bronze. It is customery to add more or less zinc or lead to copper-tin alloys. When the lead content is 10 per cent or over (often up to 30 per cent), they are commonly termed leaded bronzes or lead bronze (irrespective of the zinc content, which is usually low). Such alloys find use as bearings almost exclusively.

The term zinc bronze is in fairly common use to designate a copper-tin alloy to which zinc has been added, but in which the strengthening effect is considered as being chiefly due to the tin. Thus the older alloy made of 88 per cent copper, 10 per cent tin and 2 per cent zinc, (often abbreviated to 88-10-2) and its more modern counterpart 88-8-4, are precisely called zinc bronzes, although for brevity the term bronze is frequently used alone.

If phosphorus or silicon is added to a simple copper-tin alloy, either as a deoxidizer or in such amount that it acts as an alloying element, the result is termed phosphor-bronze (or phosphorus bronze), or silicon bronze.

When the alloys contain but three elements the use of the name of the third added element before the word bronze is therefore fairly well established for scientific terminology. But usage is not so well established for brass. The term leaded brass is in common use for a copper-zinc alloy containing lead, but a brass containing a little tin, which by analogy would be called tin brass, is seldom so called. Instead, such terms as admiralty metal or Tobin bronze are used, the latter being obviously a misnomer because, while a little tin enters into the alloy, the zinc is present in far larger amount and is more responsible for the alteration of the properties of the copper with which the two elements are alloyed.

If a little nickel is added to admiralty metal the alloy is sometimes termed adnic. These specific terms have the advantage of connoting, to one who is familiar with the term, both the qualitative composition and the amounts of each present. To a great many, however, these specific or trade terms are confusing.

German Silver an Unsatisfactory Term

Some specific terms, such as German silver, may be very misleading, because it contains no silver and the only excuse for the term was that the alloys are white in color. These copper-nickel-zinc alloys are now more often termed nickel silver, which is also a misnomer. According to a decision of the United States Federal Trade Commission (docket 1479, Feb. 6, 1928) the words nickel silver should not be used to advertise or describe alloys which do not actually contain both of those metals. Since alloys of this family are essentially copper-zinc mixtures to which sizeable percentages of nickel have been added, the logical term would be nickel brass. Universal acceptance of such a term will probably be resisted by commercial interests on the basis that the word brass connotes an inferior alloy (as bronze is supposed to represent a superior one, to the uninitiated); consequently, a high-grade alloy with good physical properties should not be called "nickel *brass*." Nickel alloy, with the percentage of nickel noted (like "18-per cent nickel alloy") is now being used by some producers.

Logical systems become cumbersome with a four-component alloy. In referring to the very common alloys of copper, tin, zinc and lead it is not concise to call them zinc-lead bronzes, or tin-lead brasses. In many cases it is difficult to decide whether the tin predominates as an alloying element, making the alloy a bronze, or the zinc, making it a brass. One cannot decide on the basis of whether zinc or tin is present in the larger percentage, since a given percentage of tin affects the alloy more than an equal percentage of zinc. In the alloy 85 per cent copper, 5 per cent tin, 5 per cent zinc, 5 per cent lead ("85 and three 5's") a slight change in the tin content will affect the properties more than an equal change in zinc, so that it cannot be called a misnomer to term the alloy a bronze. It is about as often called valve bronze as it is red brass or, evading the question of whether it should be viewed as a bronze or a brass, the terms composition metal, or ounce metal, have been used. (The alloying elements are in approximately the ratio of one ounce each to one pound of copper.)

Where definite specifications exist, such as those of the Federal Specification Board or the American Society for Testing Materials, reference to the specification number definitely fixes the composition, qualitatively and quantitatively. Thus "F. S. B. No. 2 Bronze for Castings" is the "85 and three 5's" alloy. However, "F. S. B. No. 2 Bronze for Castings" is not a very manageable name for an alloy, for conversational uses.

Does Two Per Cent Tin Make a Bronze?

The question whether an ornamental casting, used as a book-end, which contained 85 per cent copper, 2 per cent tin, 12 per cent zinc and 1 per cent lead, should be classed as brass or bronze, has been considered by the Better Business Bureau of New York, and a conference held in 1927 agreed that art castings described as bronze should contain a minimum of 85 per cent copper and 3 per cent tin. Since color, weight and ability to be cast govern the choice of an alloy for such uses, rather than the mechanical properties, it is obvious that a high percentage of tin would be an economic waste.

Multiplicity of alloys of copper, tin, zinc and lead in commercial use complicates the problem of nomenclature. With a few well-recognized alloys described by specifica-

tions, the specification number would come to have a definite meaning. Generally the properties of these quaternary alloys vary only gradually with reasonable changes in composition. Alloys of compositions between the limits set for two "standard" alloys of the Federal Specifications Board or the American Society for Testing Materials may be entirely usable, and in some conditions may be both cheaper and better. Instead of there being for a given purpose but one composition whose specification limits may not be exceeded without producing inferior material, there is a range of compositions (in bearing bronzes at least) of practically equal engineering value. The purchaser who lays down needlessly close specifications adds to the cost of manufacture and to the purchase price, without any corresponding gain.

Governmental Bronze

There is a widespread but erroneous belief that there is a definite composition of bronze officially accepted by the United States Government as the best. One of the alloys of longest commercial use is that of 88 per cent copper, 10 per cent tin, 2 per cent zinc, or 88-10-2. Back in the days when cannon were made of bronze this was known as gun bronze, and for many years the United States Navy had a specification for Navy "G" metal of this composition.

The separate Navy specifications for this alloy are now superseded by the Federal Specifications Board specifications, and the 88-10-2 alloy is superseded by "F. S. B. No. 5," (88-8-4), this composition being on the whole a better all-around alloy for a certain group of purposes.

But the 88-8-4 is no more a "government bronze" than any of the others in the Federal Specifications Board specifications.

In the field of statuary bronzes or art bronzes, there is a similar erroneous idea that there is one government bronze, the composition of this one being set at 90 per cent copper, 7 per cent tin, 3 per cent zinc. The history of this seems to be that in 1895, when purchasing a statue of John Hancock, an individual purchasing officer wrote that the "U. S. Standard bronze to be used should consist of 90 parts of copper, 7 parts of tin, 3 parts of New Jersey refined spelter." One or two firms, assuming that this phraseology had legal effect, set up this composition as, in their estimation, "U. S. Standard" and have claimed that the phrase should be used in somewhat the same manner as the terms sterling silver or 18-carat gold are used. That the Government has not necessarily adhered to this so-called standard, even in its statuary purchases, is shown by the fact that the bronze group in front of the library of Congress was made of an alloy of 90 per cent copper, 8 per cent tin and 2 per cent lead.

There is a prevalent idea that a statuary bronze must contain at least 90 per cent copper or it will stain a stone foundation, and that a similar copper content is required to allow the statue to acquire a pleasing patina. The correctness of these ideas seems doubtful. Various alloys containing from 90 to 80 per cent copper exposed for over 10 years at the Bureau of Standards show very little difference in color.

Manganese and Aluminum Bronzes

The term bronze is also used with some modifying adjective to refer to strong alloys of copper containing little or no tin. Manganese bronze is a name given to a group of alloys containing, besides copper, about 38 to 45 per cent zinc and small amounts of other elements such as tin, iron, aluminum and manganese. One type contains about 3½ per cent manganese while in others the manganese content may be only ½ per cent or even less. These alloys are really high-strength brasses, but the erroneous name is ingrained in engineering practice.

The alloy of about 90 per cent copper with 10 per cent aluminum (with or without a little iron) is generally called aluminum bronze, yet the alloy contains no tin, nor does it have a bronze color.

Other Uses of the Term Bronze

On account of the fact that the color of the alloy is similar to that of true bronzes, the alloy of 90 per cent copper, 10 per cent zinc, used to a considerable extent for wrought products, is quite generally termed bronze or commercial bronze. Bronze wire for screen cloth is often made from this alloy.

Still another use of the word bronze is for metallic pigments. Finely divided, flaky metal particles, whether of copper, copper-zinc alloy or aluminum, are termed bronze powders. Hence aluminum bronze may refer either to the 90 per cent copper, 10 per cent aluminum alloy or to an aluminum powder pigment, neither material being a bronze.

Electrical Equipment for French Blooming Mill

EARLY in 1927 the Société Metallurgique de Senelle-Maubeuge put into service in its plant at Longwy a new electric motor built by the Société Alsacienne de Constructions Mécanique to operate a 43¼-in. reversing blooming mill. A brief description of the equipment and its operating characteristics appears in a recent number of *Genie Civil*. The mill handles steel ingots 23½ in. square and weighing between 5 and 6 tons. It produces 80 tons of blooms an hour, varying from 4¾ by 4¾ in. to 12½ by 12½ in.

In making blooms of 5½ by 5½ in. the rolling operation is accomplished in 19 passes. The maximum power exerted in rolling has been found upon test to be about 16,000 hp.

Rolling Rails from Square Blooms

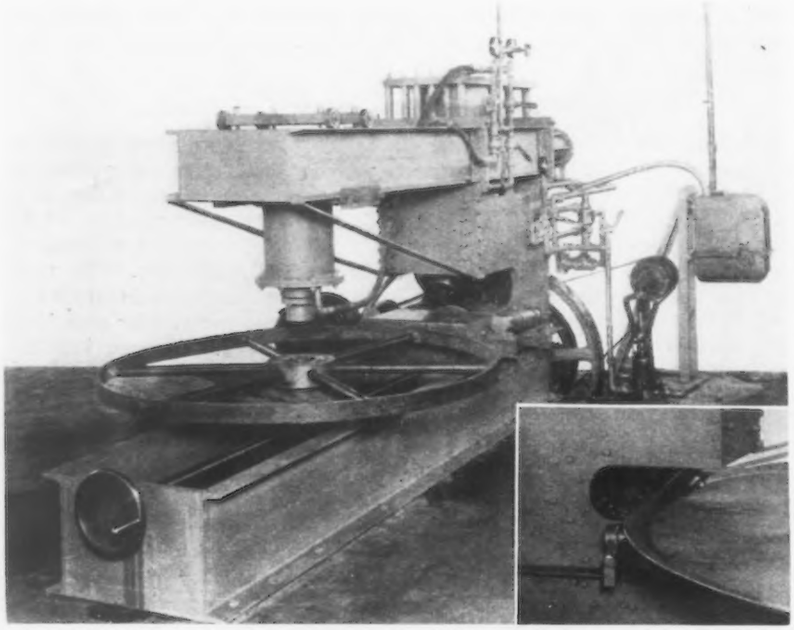
Blooms of 5½ by 5½ in. are later rolled into rails weighing 55 kg. to the meter (110 lb. to the yard). Hourly production of rails is from 40 to 70 tons. Here again the maximum power exerted in rolling is approximately 16,000 hp.

It happens, however, that the power consumption of the finishing train is very variable, because of great variations in steel temperature from one sectional area to the next. Tests have shown that the rolling resistance may easily increase by 50 per cent if the temperature of the ingot is lowered. The works have, however, made installation of generators of identical size to fit the blooming mill and the finishing mills, because the maximum power required in each case is so nearly the same.

The converting group includes two generators, a three-phase motor and an exciter. The latter serves in part to equalize the power factor for the converting motor and in part to take the place of the rheostat necessary in starting the machines. All these machines are mechanically coupled. The generators have an average rating of 2100 kw. to the unit, with the maximum running up to 6300 kw., while the motors have a mean rating of 5500 hp., operating at 3000 volts and 27.5 cycles.

Flanging Machine Equipped with Roller Bearings

ADVANCED ideas in machine construction, such as the use of welded structural steel for stress-carrying units, and Timken roller bearings on all moving parts, characterize a new line of flanging machines built by Blue Valley Machine & Die Works, Kansas City, Mo. Four machines of different size and power will handle plates from No. 24 gage to ¾ in. in thickness, and make heads ranging in diameter from 18 in. to that of the widest sheet which can be bought.



Timken Equipped Flanging Machine. Insert shows 45 deg. roll in contact with upper surface of plate, and lower forming roll tilted slightly to start the flange

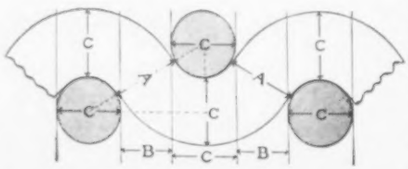
The main frame is of structural shapes and heavy plates, welded together where permanent joints are permissible, and firmly bolted where access to interior mechanism may occasionally be demanded. The supporting spider, forming the rotating bed of the machine, is completely welded from a bar steel rim, seamless tubing spokes, and a forged hub.

Operations are controlled from one position, where the workman has a clear view of the work at all times. Flanging is done by the high speed spinning process, the flange being bent upward by two working rollers and one spinning roll. After the spider center and the plunger above is centered at the proper place, the round plate to be flanged is loaded into the machine and the hold-down plunger operated by compressed air. The edge of the plate rests on a driving roll, and the upper, 45 deg. roll is lowered until it rests on the top surface of the plate (as shown in the insert). This 45-deg. roll is mounted on an idling stub shaft on the extension of the plunger of a compressed air cylinder. When the proper squeeze is applied, and the lower roll is driven through the appropriate gearing from a 10-hp. motor, the plate spins rapidly and the edge may be gradually forced up to the correct angle.

This latter operation is done by a segment roll, which in the idling position appears to be merely an extension of the lower driving roll. It is mounted on a carriage which fits in curved guides on the sides of the body, so it may be moved by a two-way hydraulic cylinder to any angle up to 90 deg. When the flange is completed the working rolls and center hold-down are backed off, releasing the plate. Meanwhile the motor is stopped and the finished plate may then be removed from the machine. As a result of the roll arrangement and control, flanges are made with no sign of distortion or wrinkling in the finished head, despite the speed with which the operation is performed.

Wire Cloth of Exceptionally Heavy Section

AN unusually heavy type of wire cloth has been perfected by the Ludlow-Saylor Wire Co., St. Louis, and is shown in section in the accompanying diagram. This particular cloth is made in 50 x 50 mesh of No. 33 W & M gage steel wire (0.0118 in diameter). The diameter of the wire is 0.0036 in. larger than the nominal opening of 0.0082 in. between wires.



Showing How the Heavy Mesh Is Made Possible

As the sketch shows, the opening width *B* may contain a wire of greater diameter *C* passing through, because the diagonal *A* between wires in the opposite direction is greater than *C* and is correspondingly much greater than the nominal opening *B*.

Develops a Two-Stage Oxygen Regulator

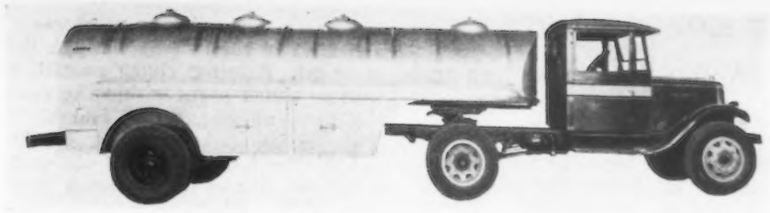
THE Oxweld Acetylene Co., 30 East Forty-second Street, New York, has designed a two-stage oxygen regulator to eliminate fluctuation in working pressures. This regulator, which is designated the Prest-O-Weld type R-109, accomplishes two-stage pressure reduction by independent sets of diaphragms, stem-type valves and springs. In the first stage the full cylinder pressure of about 2000 lb. per sq. in. is reduced through a non-adjustable reducing valve to about 175 lb. per sq. in. Leaving the first stage the oxygen passes to a second valve and diaphragm assembly, where the pressure is reduced to that desired by the operator, and is adjustable by means of the hand wheel. The second stage is thus required to regulate pressures within only a narrow range, which it can do easily and efficiently.

When the pressure in the cylinder falls below about 175 lb. per sq. in., the first-stage valve remains fully open. It is thus automatically cut out of the system and the second-stage valve and diaphragm only are operative. The type R-109 regulator will operate with equal efficiency whether the oxygen cylinder is full or nearly empty, and the working pressure will remain constant.

In the past a careless operator might open a cylinder valve with the adjusting screw of the regulator turned in, thus permitting the full cylinder pressure to enter the low-pressure gage and rupture the Bourdon tube or damage the valve stem or seat. Such danger has now been eliminated, since it is impossible for the full cylinder pressure to enter the low-pressure gage, and the first-stage valve is of such sturdy design that it will withstand the most severe impact likely to occur.

Silver Solder for Stainless Steel

Compositions containing some silver and melting at 1435 to 1600 deg. Fahr. have been developed by Handy & Harman, New York, for brazing or soldering stainless steel. It is stated that this solder makes neater joints because only a small quantity is required to make a joint. The power of silver to resist corrosion, its malleability and strength are offered as additional advantages. As these silver solders withstand working temperatures up to 1400 deg. Fahr., they are adapted to soldering or brazing parts which encounter heat in service.



Develops an All-Aluminum Truck Tank

THE application of aluminum in truck tank construction has recently been made by the Standard Steel Works, North Kansas City. It is an answer to the problem of obtaining the greatest possible pay load with the least possible deadweight of construction; 2400-gal. aluminum tank weighs 2775 lb., the 2400 gal. of gasoline 15,840 lb., and the drop frame semi-trailer and fifth-wheel, 5300 lb., a gross weight of 23,915 lb.

The aluminum is used as non-corrosive as minimizing evaporation and, in the event of a change of design in truck or trailers, as affording a ready resale for scrap.

The price of an aluminum tank, which is almost three times that of a steel tank, is compensated for by the fact that a one-fifth increase in pay load capacity is obtained without increasing the deadweight. By using a slightly heavier gage of aluminum than would be used in a corresponding tank constructed of steel, the aluminum unit is calculated to be the equal of steel in tensile strength, rigidity and other physical characteristics.

The tank building department of the company has been in production several months. Formerly about forty steel tanks were constructed every thirty days. The rate of production of aluminum tanks is expected to be increased about 25 per cent during 1930. New equipment has been installed for the purpose.

In 1913, when P. G. Walton became president, the works were located in Kansas City itself. In 1921 the increase in business necessitated larger quarters, which were secured in North Kansas City. During 1926-28 a building was added for the aviation construction department, engineering and experimental departments, laboratory and paint shops. This modern unit, 118 by 300 ft., has two floor levels providing triple the amount of space of 16 yr. ago. The company specializes in fabricating sheet steel. Originally the business was largely dependent upon the oil trade, but it now includes agricultural equipment, road and street products, the aluminum truck tanks and all metal airplanes. It expects to get into commercial production on all-metal monoplanes, largely of aluminum, about February, 1930.

New Rotary Pneumatic Grinder

WITH pneumatic grinders based on the rotary principle, the Independent Pneumatic Tool Co., Chicago, has evolved a new line of equipment calculated to reduce repair costs and give greater operating speed. In addition to greater efficiency, the makers of the Thor line claim substantial weight reductions for the various machines.

The high speeds possible with rotary motors for equivalent air consumption and reduction of vibration are said to make for smoother operation.

The Thor line ranges from grinders having a tool speed of 28,000 r.p.m. carrying an elastic bonded wheel of 1¼-in. diameter to a machine revolving at 4300 r.p.m., with an 8-in. wheel—the latter, its No. 260G, being illustrated herewith.



Rotary Grinder with Speed of 4300 R.P.M. The weight of the machine is 13½ lb.

New Stoker Drive to Give Variable Fuel Feed

A three-speed reducer has recently been developed by Gears & Forgings, Inc., Cleveland, for use on automatic stoker drives. The change of speeds is accomplished by a hand wheel operating a threaded shaft, upon which the shifting fork is mounted. This wheel, easily accessible to the operator, enables him to regulate the amount of coal fed to the boiler by merely changing the speed of the drive unit.

The change gear box consists of a splined shaft, which is an extension of the worm gear shaft mounted on two sets of Timken roller bearings and a jackshaft upon which two sets of change gears are mounted. The sliding gears on the splined shaft engage either one of these change gears, or by means of a clutch engage the gear mounted on the worm gear shaft.

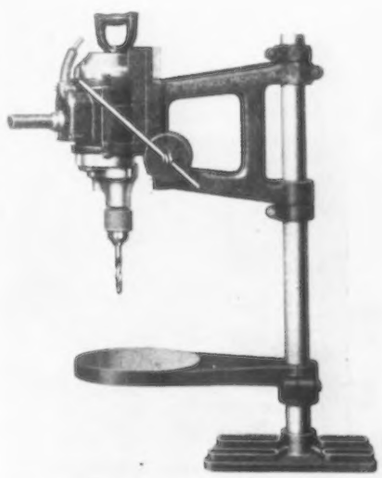
The housing is semi-steel, consisting of three sections split horizontally, bolted together. All change gears, bevel gears and worms are carburizing steels, heat treated.

Installations of this drive are being made on automatic stokers manufactured by the Modern Coal Burner Co., Chicago.

Radial Drill Stand Adapts Electric Tools for Shop

USERS of portable electric drills up to ⅞ in. capacity made by the Hisey-Wolf Machine Co., Cincinnati, can procure a stand which adapts the machine to shop work where portability is not an essential requirement.

Either bench or post mounting base will be supplied with the stand. The drill motor clamps in a cradle hung on an arm over the table. The post on which the arm is mounted is round, and permits swinging the drill



Lever Feed Is Through Rack and Pinion, Providing Positive and Sensitive Control

through a lateral arc on the post mounting, and where the press stands on a bench a complete circle can be accomplished. The feed is through a rack and pinion the same as a drill press sensitive feed. Vertical adjustment of 7½ in. is possible without shifting the motor holding arm up or down on the post. A total shift of 13 in. may be obtained by loosening two collars and raising or lowering the arm on the column.

The throat opening from the drill center to the vertical column is 13 in. The table is collared to the riser in the same manner as the arm which supports the drill.

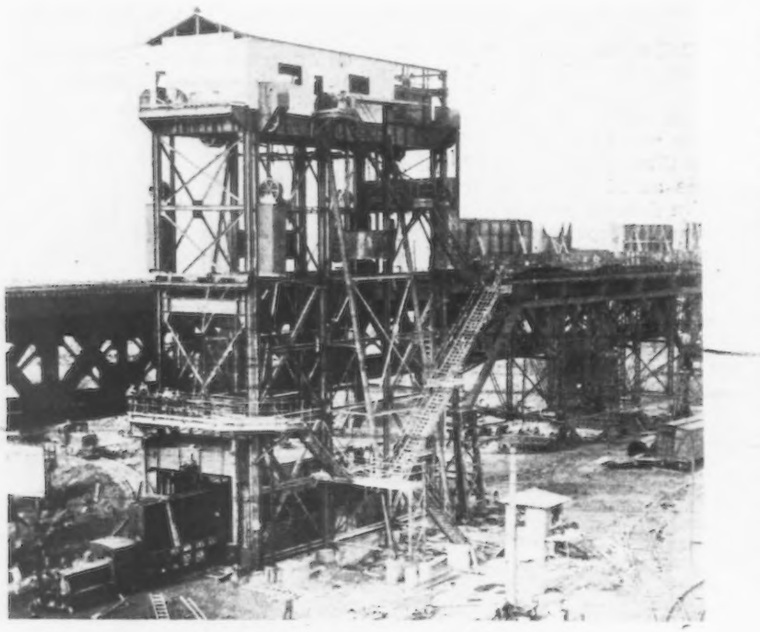
Possible loss of parts from the drill is avoided by the arrangement of the cradle which takes the drill unit without dismembering.

Post & McCord, New York, have received the contract for the erection of the structural steel for the new Empire State Building, to be erected on the site of the old Waldorf-Astoria Hotel, New York. The American Bridge Co. will fabricate the steel, amounting to more than 50,000 tons.

Unusual Hoist for Loaded Cars

200-Ton Unit Lifts Cars 50 Ft.—Ample Safety Devices and Easy Control Are Features

FOR raising loaded freight cars to an elevated railroad siding an electrically operated 200-ton freight car hoist possessing novel features of design recently was placed in service at the Brunots Island power station of the Duquesne Light Co., Pittsburgh. The hoist operates in a structural steel shaft at the end of the elevated siding and connects with a railroad track on the ground 50 ft. below. It handles cars loaded with supplies for the power station.



Loaded Cars Are Raised 50 Ft.

A single-track platform or cradle on the hoist is designed to handle the heaviest cars at a normal hoisting speed of 10 ft. a minute, the speed being greatly reduced automatically at end of travel, and slow at the start. The cradle is 68 ft. long, 24 ft. 3 in. high and 17 ft. 3 in. wide. Cars are secured to the track by portable locking devices clamping on the head of the rails. Hydraulically operated buffers in a pit under the hoist cushion the cradle landing.

Motor-operated movable rest bars, one at each corner, are mounted on the cradle. These engage supports on the structural frame, thus maintaining the car flush with the landing at both upper and lower levels. The weight of the cradle is counterbalanced, except for allowance of an overhauling weight sufficient to lower it when empty.

The cradle framework is a rectangular structure of rigid lattice construction. The upper ends of the cradle are equipped with motor-operated gates controlled to either open or close in unison. The gate mechanism is of the rope-drive type, worm-gear driven. The cradle rest bars are operated by levers that take their motion from a motor-driven crank through a worm-gear unit which is a duplicate of that used for the cradle gate mechanism.

The shaft has two counterweighted landing gates, one on the upper and one on the lower level. Each gate is motor operated through a worm-gear reduction unit and a rope drum type drive. The gates are equipped with hydraulic buffers.

Power for the cradle or main hoist is from a 100-hp., 2-speed induction motor, being transmitted through a flexible coupling to a double reduction of herringbone cut gears to the driving shaft, and through pinions, drums and a set of blocks and eight lines of 1⅛-in. diameter wire ropes. The hoisting machinery is mounted on top of the tower. All motors have magnetic brakes and push-button control.

Shaft structures and machinery house were designed by the Pittsburgh branch of the Byllesby Engineering & Management Corporation. The hoist and its equipment were designed and built by the Wellman-Seaver-Morgan Co., Cleveland.

Two Speed Mill Drive

FOR the heavy machinery field, a two-speed mill drive has been developed by Gears & Forgings, Inc., Cleveland.

Powered with a 1000-hp. motor, one of these drives is being used on a slabbing mill by a large steel plant. With a motor speed of from 445 to 590 r.p.m., the mill speed is 9.01 to 11.94 r.p.m. through one set of gears, and 12.01 to 15.93 r.p.m. through the other set. External clutch mounting, with no clutch parts within the gear enclosure, allows narrow and rigid gears to be used, according to the maker. The total weight of the unit is 350,000 lb. and it occupies a floor space of 17 x 26 ft.

Degreasing Metal Objects by Vapor Condensation

A VAPOR-BATH process for degreasing metals and other impervious materials has been developed by the Carrier Engineering Corporation, Newark, N. J. In this process a solvent known as Cecolene is boiled and vaporized.

In the standard tank form of the apparatus the vapor rises to the level of water-cooled condenser coils around the sides near the top of the tank, is condensed and precipitated to the bottom of the tank. Since the vapor is more than three times as dense as air, there is no tendency to overflow or escape.

Objects to be degreased are suspended in the vapor, which condenses on their cold surfaces at once and runs off profusely, carrying grease with it. The objects are kept in the vapor until they heat up to its temperature, in from 1½ to 3 min., the time depending upon the gage or weight of the metal or other material. They are then removed in a warm, perfectly dry and clean state, any foreign matter remaining being in the form of dust easily removable.

Objects being degreased do not come into contact with grease previously removed from other material, since the solvent vaporizes at a temperature much lower than the grease, which remains in the liquid below. Economy results from the fact that the chlorinated solvent can be used over and over, the vapor never becoming "dirty."

The vapor degreaser is to be made in standard dip tank units, and in special designs adaptable to any size or style of continuous conveyor in line assemblies, and to steam, gas or electric heating. The makers are prepared to make surveys of any special degreasing problems. Cecolene is a blanket term for a group of chlorinated solvents adaptable to various uses and materials.

Obvious uses for this device are in degreasing metal stampings, die castings, bolts and nuts, metal furniture, metal lacquerware, hardware of many kinds, motor parts, kitchenware, dishes, leather belts, brakebands, articles of glass, bakelite, celluloid and many other products requiring a cleaning of grease before finishing or packing for distribution.

Cloth and porous fabrics cannot be degreased in the vapor, but it is said that anything can which is impervious enough to permit the condensed fluid to run back into the reservoir.

Outlook Is for Seasonable Gains in Production in January and February

BY LEWIS H. HANEY
Director, New York University Bureau of Business Research

THIS is an attempt to analyze the broad statistical position of the iron and steel industry at the beginning of 1930.

Attention is invited to the accompanying chart because it represents a careful attempt to appraise the true position of production with reference to normal, eliminating the merely seasonal variations and showing the true underlying trends.

Briefly, the facts developed are as follows:

(1) Ingot production in December was approximately 17½ per cent below "normal."

(2) Ingot production was sharply curtailed in the last quarter, the December adjusted index falling 43 per cent below the June peak. At 83 per cent of normal, it compares with 93 per cent in November, and 117 per cent a year ago.

(3) Pig iron production in December was 3 per cent below normal.

(4) The output of pig iron declined only 26 per cent from its peak in July. At 97 per cent of normal in December, it compares with 111 per cent in November and 116 per cent a year ago.

(5) The steel ingot output, from being relatively high compared with pig iron production, has fallen to a comparatively low level.

(6) The unfilled orders of the Steel Corporation at the end of December, at 4,417,000 tons, showed an increase of 7 per cent. The normal seasonal increase for the month is somewhat over 4 per cent. Accordingly, our adjusted index (based on the average for 1923-1927) rises to 97.4, against 94.7 in November. This compares with 87.7 a year ago.

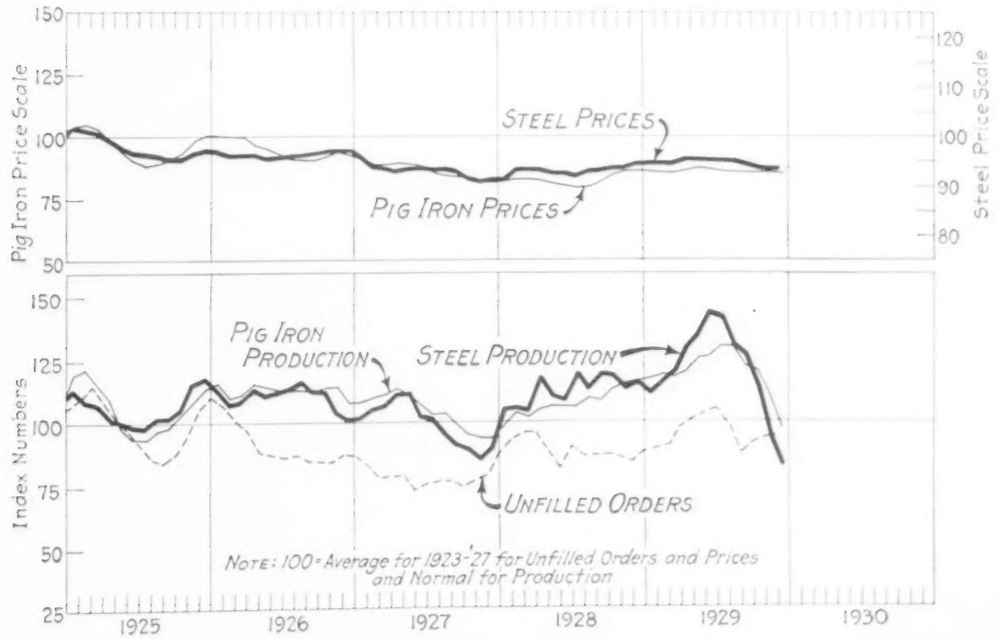
(7) The steel production curve has fallen below the level of the unfilled orders curve for the first time since early 1925.

(8) As to prices, we find THE IRON AGE composite index of finished steel averaging 93.6 per cent of the 1923-1927 level. The pig iron composite price in December averaged only 85.2 per cent of its level for the same five years. Steel prices were unchanged from the November average, but pig iron declined a little. Both are about one point lower than a year ago. Judged by the standard of recent years, finished steel and pig iron price averages are in normal relationship.

It would seem fair to conclude that stocks of pig iron have been accumulating during the past two months. And if this conclusion be correct it would follow that a further decline in the average price of pig iron is probable.

It is fairly clear that the December increase in the unfilled orders of the Steel Corporation was not so favorable as it would seem at first glance and it may well be that on this occasion it reflects continued recession in shipments.

In some respects, the whole situation is most closely comparable with that found at the end of 1923. At the present time, however, there is no probability of any such pick-up of automobile production or building activity as occurred early in 1924. There is thus no probability of any more than a seasonal gain in production during January and February, and hardly that.



Curves Show, Among Other Things, the Sharper Curtailment of Steel Production as Compared with Pig Iron

This Issue in Brief

Cuts cost of jigs and fixtures by making them from welded structural shapes instead of cast iron. Year's test reveals that they hold their shape. Maintenance cost is lower.—Page 232.

* * *

Don't make the mistake of giving apprentices the idea that they are being trained to become executives. Of course, some will advance, but the main thing is to train them to do good shop work at reasonable cost.—Page 215.

* * *

Proper mixing of gases offers opportunity for reducing cost of producing iron and steel. It is wasteful to use rich gas for low-temperature work. Fuels too lean to be used alone can be utilized through enrichment.—Page 219.

* * *

Speeds aircraft production by flattening the longerons at the joints, in special dies. Necessity of cutting curved and bevel ends on the abutting members is thereby avoided.—Page 230.

* * *

Quenching furnace waste heat is used to heat boiler which supplies steam for pickling.—Page 228.

* * *

Superior physical properties and moderate cost are reasons for selection of medium-manganese steel for motor truck and bus side frames. Tests show it to be stronger than higher-priced alloy steels.—Page 228.

* * *

Costs are increased without any corresponding return by insisting on needlessly close specifications for bearing bronzes. Generally the properties vary only gradually with reasonable changes in composition.—Page 237.

Reduced by 75 per cent time required for getting jigs. The most complicated welded jig can now be obtained within a week at the most. Average time is four days. When castings were used four weeks were required.—Page 232.

* * *

Welders are required to stamp their work with a stencil. This identifies the welders and serves to improve the quality of the welding.—Page 232.

* * *

Too much theory and too little practice kills interest in any apprentice-training program. The boy can learn more in one hour's actual practice than in two weeks of observation or explanation.—Page 216.

* * *

No such thing as "Government bronze." No definite composition has been accepted by the Government as being best. Back in the bronze cannon days the Navy had a gun bronze called "Navy G."—Page 236.

List of Steel Trade Names Is Now Ready for You

TO fill a long-felt want, The Iron Age has compiled a list of trade names of tonnage steels and steel mill products. Nothing of this kind has hitherto been available, and considerable research was necessary to make the list reasonably complete.

The products included are alloy bars, carbon steel bars and shapes, corrosion-resistant metals, forgings, pipe and tubes, sheet mill products, tin and terne plate and wire mill products. The list gives not only the name and address of the maker and a description of the product, but also, where necessary, the composition of the steel. See page 275.

Avoids cracking in the forming presses by using carefully made basic open-hearth steel. Maker of alloy steel side frames for motor trucks and buses finds that acid steel cannot be worked easily or successfully.—Page 229.

* * *

What Is the difference between a bronze and a brass? The term bronze is loosely used. Bureau of Standards says it is any alloy of copper and tin containing 50 per cent or more of copper and no other alloying metal besides tin. Better Business Bureau says tin content must be 3 per cent minimum and copper not less than 85 per cent.—Page 236.

* * *

Tool designer had to study welding procedure when welded construction of jigs and fixtures was adopted. Along with the drawing of the jig he makes a welding and machining sketch, which shows what material is to be ordered and what shapes are needed. It also indicates the total length of weld necessary.—Page 232.

* * *

Regular operators are ordinarily poor instructors for apprentices. They will not take the time to explain. They delight in "kidding" the novice, and 75 per cent of the apprentice's time is wasted. Boys learn best under an instructor's supervision.—Page 218.

* * *

Aircraft builder avoids welding distortion and subsequent heat treatment by bolting vertical members of wing beam to main longitudinals with nickel steel bolts. Believes this type of construction superior to welded joints.—Page 231.

River Craft Took More Steel in 1929

Barge Launchings Declined Last Year but Total Steel Used Increased 17,000 Tons—1930 Prospects Good

LAUNCHING of river barges of larger size last year brought the total amount of steel used for craft designed for inland waterway service to 79,834 tons, the highest figure reported since THE IRON AGE began its annual survey of this construction in 1925, and a gain of more than 17,000 tons over 1928. The number of hulls placed in service, however, declined to 480, as compared with 529 in the previous year and 506 in 1927. Stated in gross registered tonnage, last year's launchings amounted to approximately 200,000 tons, as compared with 155,000 tons in 1928 and 180,000 tons in 1927.

These figures were obtained from the same 10 builders which have reported their figures in the past and whose products are largely used for river commerce. The companies reporting are as follows: Alabama Dry Dock & Shipbuilding Co., Mobile, Ala.; American Bridge Co., Pittsburgh; Dravo Contracting Co., Pittsburgh; Howard Ship Yards & Dock Co., Inc., Jeffersonville, Ind.; Jones & Laughlin Steel Corporation, Pittsburgh; Marietta Mfg. Co., Point Pleasant, W. Va.; Midland Barge Co., Midland, Pa.; Nashville Bridge Co., Nashville, Tenn.; Riter-Conley division, McClintic-Marshall Co., Pittsburgh, and Charles Ward Engineering Works, Charleston, W. Va.

The following table covers the figures of these companies in the last five years:

	Number of Launchings	Steel Tonnage	Approximate Gross Registered Tonnage
1925	269	53,710	135,000
1926	366	63,776	160,000
1927	506	72,057	180,000
1928	529	62,443	155,000
1929	480	79,834	200,000
Total	2,150	331,820	830,000

Canalization Brought Gains

As the above figures indicate, last year saw the largest addition to gross registered tonnage which has been placed at the disposal of river commerce in any like period, and the greater part of this capacity was placed in service on the Ohio and Mississippi Rivers. Completion of the Ohio River canalization project during the year, assuring a 9-ft. stage on the river between Pittsburgh and Cairo, Ill., during the entire year, undoubtedly gave impetus to barge building which will also be felt this year. This may also have stimulated the building of barges of larger size, although the order for 40 large barges placed in the early part of 1929 by the Inland Waterways Corporation was the principal factor in increasing the average size of barges built during the year. These barges required 560 tons of steel each.

As is usually the case, Pittsburgh district barge builders supplied about 70 per cent of the units launched in 1929, and their operations required about 80 per cent of the steel used. The five companies outside of the Pittsburgh area and the Atlantic seaboard plant of one of the Pittsburgh companies launched 139 units, but these included a goodly number of the towboats, scows and miscellaneous craft which are included.

At the beginning of the new year prospects for river craft building are generally considered satisfactory. Prospective business is estimated by one builder as being about 25 per cent greater than it was one year ago, and, although actual inquiry is not large, a number of companies are said to be preparing plans for additions to their fleets. The Inland Waterways Corporation is said to have tentative plans for duplicating its large 1929 order this year, and a recently organized company is preparing specifications for 60 small barges. With river traffic in iron and steel products out of the Pittsburgh district increasing rapidly, it is not unlikely that additions will be made to steel company fleets, while private barge lines will also benefit by this business. During the greater part of 1929, shortage of barges on the Ohio River in the Pittsburgh district was reported, and this lack of capacity is likely to be felt more keenly this year.

Conference on Machinery Depreciation Feb. 3

WASHINGTON, Jan. 14.—Robert H. Lucas, commissioner of the Bureau of Internal Revenue, has informed machinery and equipment associations that they will be given an opportunity to participate in the development of statistics being gathered by the bureau for fixing basic rates of depreciation applicable to industrial machinery.

His statement was carried in a letter addressed to Philip P. Gott of the Chamber of Commerce of the United States as secretary of the Conference of Machinery and Equipment Associations, which at its fourth meeting in Washington on Nov. 11 adopted a resolution regarding the subject of depreciation, a copy of which was forwarded to Commissioner Lucas. In the resolution, cooperation between the bureau and the machinery and equipment associations in determining basic rates of depreciation on industrial machinery was urged. The feeling had developed that the cooperation which originally had begun had been done away with, with the result that the rates which it was said had been considered were not fixed on a reasonable basis. Commissioner Lucas advised the associations that a number of issues pertinent to the problem, such as the advisability of publishing depreciation data and the manner and form of such publication, are still under consideration by the bureau. Prior to the publication of any depreciation data, he said, the associations will be given an opportunity to cooperate in the development of the statistics.

In an announcement regarding the fifth conference of the associations, to be held in Washington on Feb. 3, Secretary Gott pointed out that E. F. DuBrul, chairman of the conference and general manager of the National Machine Tool Builders' Association, has requested detailed suggestions concerning subjects for the program and has indicated in several letters possible activities and values which might result from cooperative action, provided that the many associations in the industry are willing to lend their support through their attendance and cooperation in any program adopted. It has been suggested that each association be represented by its president or other outstanding representatives of the industry, as well as the manager of the association. The complete program will be forwarded to the associations as soon as it has been prepared. Hope was expressed for a representative attendance at the conference and suggestions or comments on any phase of the program have been sought.

New Drop Forging Plant at Los Angeles

Formation of a new company in Los Angeles for the production of drop forgings has been completed and construction of buildings is now under way. Production is to begin during February. The company has been named the Pacific Coast Drop Forge Corporation and its officers include: J. C. Ballagh, president; Clarence White, secretary-treasurer; and Clarence Harris, vice-president and general manager.

Mr. Ballagh is secretary of Patterson-Ballagh Corporation, manufacturer of rubber protectors for oil well drill pipe and other rubber specialties. Mr. White is president of Oil Well Mfg. Co. and Mr. Harris for 30 years has been associated with the drop forge companies as a superintendent and executive.

The site of the new plant is on Alameda Street, near Randolph Street, in the southeast part of Los Angeles, and occupies two acres with 600 ft. of spur track from the Southern Pacific Railroad. Three drop forges of 5000-lb. capacity have been installed. A cold-cutting shearing machine has also been installed.

The plant represents an initial investment of about $200,000. Company officials plan to develop business in drop forgings from territory from Vancouver to San Diego and as far east as Denver. It is the second drop forge plant to be installed on the Pacific Coast.

To Study Waste Due to Overproduction

WASHINGTON, Jan. 14. — S. L. Mather, of the Cleveland-Cliffs Iron Co., Cleveland, is a member of a committee selected recently by the board of directors of the American Mining Congress to take up a study designed to check the present waste of the resources due to overproduction. The committee also will survey the situation in relation to the waste of capital and labor involved in overproduction. The difficulty in meeting the situation, owing to restrictions under the anti-trust laws, will be studied and an attempt made to seek a solution of the problem in order that the natural resources shall be conserved and mining placed on a more sound and business-like basis.

Society to Celebrate Fiftieth Anniversary

The Cleveland Engineering Society will celebrate its fiftieth anniversary March 14 and 15 and is preparing a program for the occasion, which will include a banquet at the Hotel Hollenden. Technical societies having local sections in Cleveland, as well as other local engineering societies in Ohio, will be asked to send two representatives, and personal invitations will be sent to engineers throughout the State. Provision is being made to entertain about 400 out-of-town visitors.

Prison Equipment Makers to Meet on Trade Practice

WASHINGTON, Jan. 14. — Commissioner Charles H. March will preside at a Federal Trade Commission trade practice conference to be held at Oklahoma City, Okla., Jan. 31, with prison equipment manufacturers who supply cell work, gratings, locking devices and other devices to jails and penitentiaries. Subjects to be taken up at the conference will be commercial bribery, secret rebates, defamation of competitors, interference with contracts, etc. Manufacturers of prison equipment have plants in such cities as Covington, Ky., St. Louis, San Antonio, Tex., Cincinnati, Cleveland, and in Georgia, Minnesota and Virginia.

Engineering Council Elects New Officers

Carl E. Grunsky, San Francisco, past president of the American Society of Civil Engineers, was elected president of the American Engineering Council at the opening session of the annual meeting of the council held at the Mayflower Hotel, Washington, Jan. 10 and 11. He succeeds Arthur W. Berresford, New York, past president of the American Institute of Electrical Engineers.

Vice-presidents were chosen as follows: L. B. Stillwell, New York, American Institute of Electrical Engineers; Major Gardner S. Williams, Ann Arbor, Mich., Detroit Engineering Society; O. H. Koch, Dallas, Tex., Technical Club of Dallas; L. P. Alford, New York, American Society of Mechanical Engineers. Dr. Harrison E. Howe, Washington, representing the American Institute of Chemical Engineers, was re-elected treasurer. Lawrence W. Wallace of Washington continues as executive secretary.

"Code" Violated; Institute Expels Member

The trade relations committee of the Institute of Scrap Iron & Steel, Inc., has issued a "cease and desist" order against one dealer, and has recommended to the executive committee the expulsion from the institute of another member. Action was taken after a hearing of six complaints on Jan. 8.

The six cases involved violations of the institute's code of business practices by consumers or dealers. The respondents were located in Illinois, Massachusetts, Ohio and Missouri. Three of them are not members of the institute.

Pipe Nipple Makers to Meet in Pittsburgh

A trade practice conference of pipe nipple manufacturers has been scheduled by the Federal Trade Commission for Tuesday, Jan. 28, in Pittsburgh, at the William Penn Hotel. Commissioner Charles H. March will preside.

Tour in Behalf of Census of Manufactures

In connection with the forthcoming census of manufactures and distribution Dr. W. M. Steuart, director of the census, will start Jan. 16 on a nation-wide trip, during which he will hold conferences with census supervisors and will urge upon manufacturers the importance of prompt census returns. Addresses on the practical use of the census data on manufactures and distribution will be made to groups of manufacturers and distributers at the following cities:

Savannah, Ga., Jan. 17
Birmingham, Ala., Jan. 20
New Orleans, Jan. 21
Houston, Tex., Jan. 22
Dallas, Tex., Jan. 23
Los Angeles, Jan. 27
Oakland, Cal., Jan. 29
Sacramento, Cal., Jan. 30
San Francisco, Jan. 31
Portland, Ore., Feb. 3
Seattle, Wash., Feb. 4
Tacoma, Wash., Feb. 5
Spokane, Wash., Feb. 6
Helena, Mont., Feb. 7
Great Falls, Mont., Feb. 8
Minneapolis, Feb. 10
Rockford, Ill., Feb. 11
Des Moines, Iowa, Feb. 12
Topeka, Kan., Feb. 13
Omaha, Neb., Feb. 14
Wichita, Kan., Feb. 17
Denver, Colo., Feb. 18
Oklahoma City, Okla., Feb. 20
Kansas City, Mo., Feb. 21
Nashville, Tenn., Feb. 24
St. Louis, Feb. 25
Cincinnati, Feb. 26
Indianapolis, Feb. 27
Chicago, Feb. 28

New England Foundrymen Elect New Officers

Ernest F. Stockwell, assistant manager, Barbour-Stockwell Co., Cambridge, Mass., was elected president of the New England Foundrymen's Association at the annual meeting Wednesday evening, Jan. 8, in Boston. Mr. Stockwell is the son of Fred F. Stockwell, who has served as secretary of the organization since its inception. Luther J. Anthony, Glenwood Range Co., Taunton, Mass., was elected vice-president. He is the son of Joseph L. Anthony, who served as president of the association in 1910. George H. Gibby, Gibby Foundry Co., East Boston, was reelected treasurer.

The following executive committee was also elected: Warren D. Kent, Grinnell Co., Providence, R. I.; Albert Sweet, Milford Iron Foundry, Milford, Mass.; Roy M. Sherwin, Brown & Sharpe Mfg. Co., Providence, R. I.; Frederick D. Shaw, Walker-Pratt Mfg. Co., Watertown, Mass.; Charles A. Reed, Rogers Brown & Crocker Brothers, Inc., Boston.

Foundation Established for Harnischfeger Employees

One of the largest single benefactions ever conferred upon employees of any metal-working concern in the Milwaukee territory was granted to the 2500 workers on the payrolls of the Harnischfeger Corporation, Milwaukee manufacturer of earth moving machinery and cranes, in the form of a holiday bonus of $75,000 and the establishment of the Harnischfeger Foundation for employees of the company through an endowment by the family of Henry Harnischfeger, president. Mr. Harnischfeger and his family donated 15,000 shares of common stock, valued at $500,000, to the foundation, which will supplant the P. & H. Welfare Association and will be administered by a committee of the employees. The Harnischfeger family hopes that, at the end of five years, when all the shares have been turned over to the foundation its earning power will be equivalent to an endowment of $1,000,000 and will suffice to provide pensions for the employees, in addition to other charitable and recreational benefits.

Debating for Engineers

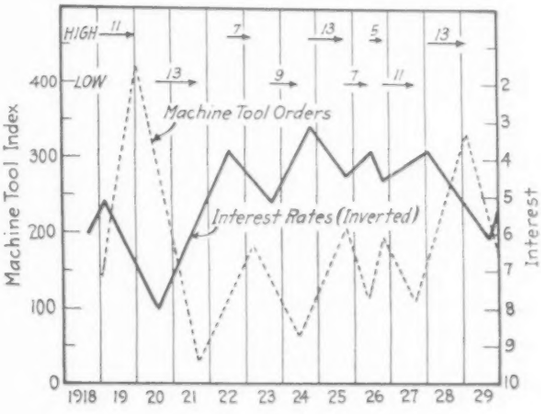
A demand that college engineers be able to express themselves adequately and forcefully before laymen interested in engineering projects has resulted in the formation of an intercollegiate debating league for technical students at the University of Michigan, Detroit Institute of Technology, University of Detroit and Michigan State College. The plan is sponsored by the educational committee of the Associated Technical Societies of Detroit, of which Elliot J. Stoddard is chairman.

A Forecast of Machine Tool Demand

National Machine Tool Builders' Association Makes Study of Orders and Interest Rates

A STUDY of machine tool orders and interest rates has been made by the National Machine Tool Builders' Association. The accompanying chart and the following explanatory text are published by permission of that association:

"Many times during the last nine years we have diligently scanned curves of various statistical series to find any that might be used as practical forecasters of demand for machine tools. We carefully charted and studied the important series reported to find any that might reliably forecast movements in machine tool orders far enough ahead to be usable but not so far ahead as to be utterly useless.



MACHINE Tool Orders Are Taken From the Index of Orders of the National Machine Tool Builders Association. The arrows in the chart indicate the lag (in months) between high points of inverted interest rates and machine tool orders, and low points of the two curves

"An ideal forecaster would have a constant lead up or down from three to four months ahead of machine tool orders. We have not found any such ideal series in all of our research during the last nine years. So we must content ourselves with something less than the ideal, provided it is reasonably practical. We could not arrive at reasonably safe conclusions until we had a considerable background of machine tool experience to compare with other series of figure facts. But now that our own index of orders goes back 11 years and covers several complete cycles we are in a position to use our figures to good advantage.

"Our study shows that interest rates on 'prime 4-6 months commercial paper' can be used as a fairly reliable forecaster, by inverting the curve so that an increase in these rates shows a declining line, and a decrease shows a rising line. This is in line with the findings of Alvan T. Simonds, of the Simonds Saw & Steel Co., Fitchburg, Mass. It seems logical to think that increasing interest rates have an influence in restricting investment in machine tools, and vice versa, just as they have such an influence on investment in building construction.

"The chart, with lines connecting the high and low points of our index and of the inverted 4-6 months paper rates, is interesting. The interest rate peaks and bottoms lead the machine tool peaks and bottoms in every cycle, although the lead is considerably longer than the ideal lead of three to four months. The length of lead also varies, being four months at the shortest, and 13 months at the longest, but averaging about 10 months lead for lows, and a trifle less for highs. As it takes from two to three months before we can be sure that our own curve has turned, this length of lead is not at all bad for us."

Engineers Discuss Welding and Cutting of Steel

Oxyacetylene cutting of steel shapes with mechanically guided torches, and the building of jigs, fixtures and special machinery by means of arc welding were covered in two talks given at a joint meeting of the machine-shop practice division of the American Society of Mechanical Engineers and the metropolitan section of the American Welding Society held Jan. 7 at the Engineering Societies Building, New York.

Progress in the cutting of steel shapes with oxyacetylene torches during the last quarter century, with lantern slides of some of the machines, both hand and mechanically guided, that have contributed toward the improvement of the process, was reviewed by F. E. Rogers, applied engineering division, Air Reduction Sales Co., New York.

Slides showing difficult and unusual work being done with modern torch units aroused particular interest. In summing up the possibilities of torch cutting, Mr. Rogers cited such work as the cutting of locomotive side frames from rolled slabs, and prophesied increasing application of the process as knowledge of the possibilities of the process gained.

J. R. Weaver, superintendent of manufacturing equipment department, Westinghouse Electric & Mfg. Co., East Pittsburgh, outlined the steps in the production of welded jigs and fixtures as it has been practiced in the Westinghouse plant for the past year. Mr. Weaver's address, substantially in full, appears elsewhere in this issue.

National Steel Plans Works at Gary, Ind.

The National Steel Corporation will build a new steel mill in the Chicago district within three years, according to an announcement issued last week by Ernest T. Weir, chairman of the board. A site of 1000 acres just east of Gary, Ind., has been purchased from the Insull interests. The new plant, Mr. Weir says, will represent an investment of $40,000,000 to $50,000,000. Work will be started as soon as the new plant of the Great Lakes Steel Corporation near Detroit is completed. The Chicago expansion, plus $25,000,000 to be expended in completing the Detroit plant and $7,000,000 for improvements at the plant of the Weirton Steel Co., will mean an aggregate outlay by the National Steel Corporation of about $72,000,000.

"The decision of the company to build in the Chicago district," Mr. Weir said, "is in recognition of the growing importance of the Middle West as a steel consuming center, and is another step in the company's program of diversifying manufacturing operations and to locate production close to both consuming markets and sources of raw material supply. The National Steel Corporation has large ore holdings on all of the Lake Superior ranges, ranking second only to the United States Steel Corporation in ownership of Lake tonnage ore as compared with its annual requirements."

New Chromite Cement Developed

Botfield Refractories Co., Philadelphia, has developed a new high-temperature cement which will be sold under the trade name of Adachrome Plastic Super-Cement. The basic material is an exceptionally high-grade chromite ore from South Africa.

Because of its chromite base, this cement is chemically inert, and is also hard, dense and highly refractory. It employs a bonding agent said to be efficient at high temperatures. It is sold in plastic form, ready for use without laborious mixing prior to use. The material is suited for making either dipped or troweled joints.

Among the destructive furnace actions to which this new cement is resistant are basic and acid slags, molten metal penetration, abrasion, erosion and chemical reaction in the burning of acid sludge. In addition, the material, when applied as a surface coating on boiler settings, protects the brickwork from the penetrating action of clinker and fusible coal ash.

Reduced Rail-Water Rates to Texas Disapproved

WASHINGTON, Jan. 14.—Efforts of steamship lines and Southwestern railroads to establish a reduction of 7.5c. a 100 lb. on iron and steel products from Atlantic seaboard producing points to Texas destinations were defeated when the Interstate Commerce Commission held, in a decision made public last Saturday, that the proposed rail-ocean-rail rates were not justified. The tariffs were supported by Eastern steelmakers and opposed by mills in the Chicago, Youngstown, and other districts west of Atlantic seaboard territory.

The proposals were made under the so-called non-concurrence plan, which, in this instance, meant that the Northern rail carriers declined to participate in the reductions. The commission pointed out that in the Southern class rate investigation it found that the non-concurrence plan of publishing rates should be discontinued and joint rates substituted. The finding in that investigation has been complied with by the carriers, and joint rail-ocean-rail rates from points in Atlantic seaboard territory to Southeastern destinations are now in effect.

Pointing out that the non-concurrence plan had been found to be unlawful, the commission said that it was unnecessary to consider further arguments offered in behalf of the respondents, including the Southern Pacific Co., the Southern Pacific Steamship Lines (Morgan Line), the Mallory Steamship Co., and the Southern Steamship Co.

Freight Rate Decisions

The rate of $1.39 a gross ton on iron and steel scrap, in carloads, from Carnegie, Pa., to Steubenville, Ohio, and Weirton, W. Va., was held to be not unreasonable by the Interstate Commerce Commission in an opinion handed down last week in connection with a complaint made by the Charles Dreifus Co. Award of reparation was ordered on shipments of scrap from Weirton to Carnegie on and after Jan. 15, 1927, and from Steubenville to Carnegie on and after Sept. 1, 1927. The rate of $1.13 charged on shipments from Weirton and Steubenville to Carnegie was held to be inapplicable and reparation was ordered on the basis of the difference between that rate and 76c., the applicable rate.

Holding that reasonable rates on wire rope from Williamsport, Pa., to Tulsa and other destinations in Oklahoma have been prescribed in the Southwestern case, the Interstate Commerce Commission in a decision made public last week dismissed a complaint filed by the Williamsport Wire Rope Co., Williamsport, and the Tulsa Traffic Association, Tulsa, and others. The rates complained against were $1.12 a 100-lb. to Tulsa, and $1.18 to the other destinations involved, including such points as Ardmore, Blackwell, Bristow, Shidler, and Healdton. The rate to Tulsa under the Southwestern decision is $1.05 and to other destinations the rates range from $1.13 and $1.24, representing both increases and decreases.

The rate of 80.5c. a gross ton on imported iron ore from the piers of the Alan Wood Steel Co., at Port Richmond, Delaware River, and Girard Point, Schuylkill River, Philadelphia, to the company's blast furnaces at Swedeland, Pa., would be reduced to 70c. from Port Richmond and to 75c. from Girard Point if the Interstate Commerce Commission adopts a report prepared by Examiner J. M. Fiedler, made public last week. He also recommended payment of reparation on the basis of the suggested new rates.

Examiner Harold M. Brown, in a proposed report made public last Saturday, held that the commodity rate on iron ore and pyrites cinder in carloads from Philadelphia, Wilmington, Del., and Baltimore to Riddlesburg, Pa., is not unreasonable. He recommended that the Interstate Commerce Commission dismiss the complaint made against the rate by the Colonial Iron Co., Riddlesburg.

Hanna Iron Ore Co. Leases Lake Superior Mines

A number of leases of iron ore properties have been concluded recently by the Hanna Iron Ore Co., a mining company in which are combined the iron ore interests of the National Steel Corporation. With the acquisition of these properties, it is stated that the National Steel Corporation, which was formed by the merger of the Weirton Steel Co., the Great Lakes Steel Corporation and the ore and blast furnace interests of the M. A. Hanna Co., will have larger iron ore reserves in proportion to its annual consumption than any other steel producer except the United States Steel Corporation.

The properties acquired under lease on the Mesabi range include the Allan Rossum reserves, the Bray and Gordon mines formerly operated by the Republic Iron & Steel Co. and all of the Great Northern Iron Ore properties containing merchantable ore that have not previously been placed under lease. These cover a large acreage and represent a substantial tonnage. A 7 per cent interest has also been acquired in the Mahoning mine of the Mahoning Ore & Steel Co., one of the largest open pit mines on the Mesabi range.

On the Cuyuna range, the Hanna Iron Ore Co. has leased the Feigh mine owned by the Northern Pacific Railroad and Northern Pacific Railroad holdings on the south range as well as leases on all the developed mines of George H. Crosby & Associates. These include the Huntington, Martin and Portsmouth mines and the old Meacham mine, adjoining the Portsmouth. On the Menominee range, the company has leased the old Cardiff mine and several sections adjoining that mine. It is conducting active drilling programs on a large tract of undeveloped property under option near the old Mansfield mine. The company is also interested with the Inland Steel Co. in drilling on a tract in the eastern part of the Gogebic range, covering approximately 3000 acres.

Steel Corporation's Orders Gain 291,848 Tons

For the fourth month in succession, unfilled orders of the United States Steel Corporation showed a gain. For December, the gain was 291,848 tons, which compares with 38,783 tons in November. The gains in October and September were 183,981 tons and 244,370 tons, respectively. The total on Dec. 31 was 4,417,193 tons, contrasting with 4,125,345 tons on Nov. 30. A year ago, or on Dec. 31, 1928, the unfilled orders were 3,976,712 tons.

Unfilled tonnage at the end of each month for the past three years follows:

	1929	1928	1927
December	4,417,193	3,976,712	3,972,874
November	4,125,345	3,673,000	3,454,441
October..	4,086,562	3,751,030	3,341,000
September	3,902,581	3,698,368	3,148,113
August ..	3,658,211	3,624,043	3,196,037
July.....	4,088,177	3,570,927	3,142,014
June	4,256,910	3,637,000	3,053,246
May.....	4,304,167	3,416,822	3,050,941
April....	4,427,763	3,872,133	3,456,132
March...	4,410,718	4,335,206	3,553,140
February	4,144,341	4,398,189	3,597,119
January.	4,109,487	4,275,947	3,800,177

The orders on Dec. 31, last year, were larger than in the previous three Decembers.

Gulf States to Build Continuous Sheet Mill

Revised plans have been completed and are expected to be approved this week for the new sheet mill to be built at Alabama City, Ala., by the Gulf States Steel Co. The plans have been in process since last September, when the company was licensed by the American Rolling Mill Co. to use its patented continuous sheet rolling method. The revised plans call for an investment of about $800,000 more than was originally appropriated for the sheet rolling equipment.

Work is nearing completion on the new building to house the new plate mill of the Gulf States Steel Co., which is a part of its development program at Alabama City.

Installation of the new blooming mill, which is the third unit of the expansion program, is to be begun about Feb. 1. It will replace the one now in use.

Jones & Laughlin Steel Corporation has moved its Minneapolis office to 1030 Rand Tower.

Resumption Near in European Steel

British Now Past Holiday Hiatus—France Lacks Skilled Labor—Germany Making More Steel Sheets—Cartels Breed Mergers

(*By Cable*)

LONDON, ENGLAND, Jan. 13.

PIG IRON is quiet, but as Scottish plants have now resumed after the holiday suspension, revival of demand is expected, and Cleveland producers are blowing in more furnaces.

Export sales of Cleveland pig iron are still limited, but Italy is buying some hematite. Hematite furnaces have disposed of their surplus supplies and are asking premiums for forward business.

Domestic demand for finished steel is improving, with a good flow of shipbuilding, structural and engineering specifications, so that mills are fairly well engaged. Export orders, however, are difficult to secure, except in the case of special Colonial Government contracts.

December exports of pig iron were 35,000 tons, of which the United States received 4000 tons. Total iron and steel exports were 332,000 tons.

Revival of tin plate business is slow, but inquiries show that there is some good business to be placed. Mills are well booked, but there is a desire on the part of some makers to fill up the gaps caused by the slight easing in prices.

Galvanized sheets are weak as a result of continued poor demand, and makers are in need of orders. Japanese thin gage black sheets are being inquired for, but makers' prices are unattractive.

Further rationalization among the British heavy steel mills is impending. Guest, Keen & Nettlefolds, Ltd., with Baldwins, Ltd., are forming a new £5,000,000 company to take over the Cardiff and Dowlais blast furnaces and steel mills, with Spanish ore interests, coke plant and certain collieries, all belonging to Guest, Keen & Margam, Ltd., the Port Talbot and Briton Ferry works with fuel plants, by-product coke ovens and power station, all belonging to Baldwins, Ltd. All other branches of both companies will continue under separate management. Dorman, Long & Co. are reported to be negotiating a merger with the Furness group of steel companies, which includes the Cargo Fleet Iron Co., Ltd., and South Durham companies.

The Whitehead Iron & Steel Co. is preparing to erect a new steel mill at Newport in Monmouthshire. The English Steel Corporation is permanently closing the Yorkshire Iron & Steel Works at Penistone, and is contemplating closing other unprofitable plants.

The Continental market is still disorganized by efforts of the cartel to fix prices and arrange extras. Consequently business is quiet.

France Still Has Labor Shortage

Skilled Workmen Needed—Farmers Feel Shortage as Workers Swell Cities' Common Labor

BORDEAUX, FRANCE, Dec. 28.—Among the countries which were in the World War France is the only one to have suffered severely in the past four or five years from a shortage of skilled labor, most of the other important nations, notably England and Germany, having hundreds of thousands of men for whom it is impossible to find employment.

The shortage in France is particularly acute in the metallurgical industries. France is primarily an agricultural country, and the bulk of French labor is still in the rural districts. Nevertheless, the present generation is showing increased reluctance to follow agricultural pursuits and is migrating to the cities and industrial areas, a migration which is particularly injurious to agriculture and of little utility to industry because of inexperience.

Some years ago, the French Government, anticipating a surplus of labor, increased the restrictions on the residence of foreigners, which caused many efficient foreign workmen to leave the country. The surplus did not develop and the Government has

British and Continental European Export Prices per gross ton, f.o.b. United Kingdom Ports, Hamburg and Antwerp, with the £ at $4.88

British Prices f.o.b. United Kingdom Ports

Cleveland No. 3 foundry	£3	12½s.	to	£3	13½s.	$17.69	to	$17.93
East Coast hematite	3	18½	to	4	1	19.03	to	19.76
Ferromanganese, export	12	5	to	12	15	59.42	to	62.22
Billets, open-hearth	6	2½	to	6	12½	29.89	to	32.33
Sheet bars, open-hearth	5	17½	to	6	10	28.67	to	31.72
Black sheets, Japanese specifications	12	10				61.00		
Tin plate, per base box	0	18⅜	to	0	18½	4.48	to	4.51
Rails, 60 lb. and heavier	7	15	to	8	15	37.59	to	42.43
						Cents per Lb.		
Steel bars, open-hearth	8	0	to	8	10	1.74	to	1.85
Beams, open-hearth	7	7½	to	7	17½	1.60	to	1.72
Channels, open-hearth	7	12½	to	8	12½	1.66	to	1.91
Angles, open-hearth	7	7½	to	7	17½	1.60	to	1.72
Ship plates, open-hearth	7	15	to	8	5	1.69	to	1.79
Black sheets, No. 24 gage	10	0	to	10	5	2.18	to	2.23
Galvanized sheets, No. 24 gage	12	5				2.67		

Continental Prices, f.o.b. Antwerp or Hamburg

Foundry iron, 2.50 to 3.00 per cent sil., 0.50 to 0.90 per cent phos.	£3	7s.	to	£3	11½s.	$16.35	to	$17.45
Foundry iron, 2.50 to 3.00 per cent sil., 1.00 per cent and more phos.	3	5	to	3	6	15.86	to	16.11
Billets, Thomas	4	11	to	4	12½	22.20	to	22.57
Sheet bars, Thomas	4	11	to	4	13	22.20	to	22.69
Wire rods, low C., No. 5 B.W.G.	6	2	to	6	4	29.77	to	30.26
Rails, 60 lb. and heavier	6	8½	to	6	10*	31.35	to	31.72
Rails, light	6	1½				29.65		
						Cents per Lb.		
Steel bars, merchant	5	5	to	5	6	1.14	to	1.15
Steel bars, deformed	5	3	to	5	5	1.12	to	1.14
Beams, Thomas, British standard	5	0	to	5	4	1.09	to	1.13
Channels, Thomas, American sections	5	12	to	5	14	1.22	to	1.24
Angles, Thomas, 4-in. and larger, over ⅜-in. thick	5	0	to	5	6	1.09	to	1.15
Angles, Thomas, 3-in.	5	6				1.14		
Ship plates open-hearth inspected	7	4	to	7	5	1.57	to	1.58
Black sheets, No. 31 gage, Japanese	12	3	to	12	4	2.47	to	2.66
Hoop and strip steel over 6-in. base	5	11½	to	5	12½	1.21	to	1.22
Wire, plain, No. 8 gage	7	0				1.52		
Wire, galvanized, No. 8 gage	8	9				1.83		
Wire, barbed, 4-pt. No. 12 B.W.G.	11	1½				2.41		
Wire nails, base	0	6¼				$1.55 per keg		
Wire nails, assortments 1 to 6-in. keg	10	6½				2.69		

*Open-hearth steel, 8s. ($1.94) per ton extra.

relaxed its restrictions on foreign workers, but the shortage of skilled labor continues.

An early improvement in this situation is not in prospect and meanwhile lack of skilled labor threatens to retard industrial progress. Furthermore, since the war the French birth rate has declined.

There is also a shortage of labor in the rural districts. Tracts of land which, prior to the war, were intensively cultivated, are now either insufficiently worked or are lying idle. In consequence, there is a demand for labor-saving appliances, which did not exist before the war, when there was an abundance of low-priced labor. Land owners are beginning to seek improved mechanical methods and are using chemical fertilizers to make agriculture more profitable.

British Make Wide Use of Rustless Steel

Believed Desirable in Reinforcing Thin Concrete Employed for Marking Disks Used in Studying Whale Migrations

LONDON, ENGLAND, Dec. 30.—British industry is making steady progress in the use of nickel-chromium steels of the austenitic variety. The newer shop fronts of London, looking like silver or platinum, are now made of this alloy. In strengthening the dome of St. Paul's Cathedral 135 tons was used and it has also been employed in sections of the huge new India House.

The white traffic-marks set in the roadway to guide traffic at road junctions are being made of high chrome-nickel alloy, and a rather unusual use is for the identification disks shot into whales to trace their movements in Arctic waters. Hitherto the metal disks used have caused a septic action which enabled the whale to shed the metal plate, but the high chrome-nickel steel is unaffected by the salt water, and the arrow attached to the disk, once embedded in the blubber, remains until the whale is caught. The Discovery, which recently sailed for the Arctic to study the migrations of whales, is carrying hundreds of these disks.

In strengthening the dome of St. Paul's Cathedral great care had to be taken to insure permanency in the supports. High chrome-nickel alloy steel had obvious advantages, but the rough oxidizable surface of the ordinary steel reinforcing bar adheres to the cement, whereas in the case of the stainless, descaled bar, which is rustless and retains a smooth surface, there is no such adhesion. The difficulty was surmounted by rolling the bar oval and indenting it so that a series of flats was formed. Tests of this design of bar developed that the plain bar, after being set in concrete, required a maximum load of only 2.85 tons for its withdrawal, while the oval indented stainless bar required 18.88 tons. Tie rods 40 ft. long, threaded at each end, and 4 in. in diameter, are now embedded in the walls of St. Paul's to tie the inner wall to the outer wall of the dome. Thus, if hair cracks ever appear in the concrete, and the inner tie rods are exposed to moisture, the inner members will not be weakened. This is leading many architects to specify high chrome-nickel alloy steel for balconies and copings, where outer covering of concrete may be thin.

The Savoy Hotel is a notable London example of the massed effect of the use of high chrome-nickel alloy. Recently a specimen of this steel was towed around the world attached to a liner as a test of its rustless qualities. In the home these austenitic steels have many uses. One large gas interest is experimenting with high chrome-nickel steel plates for the sides of its cheaper gas heaters and ranges, so that when the stove is returned for reissue it may be rebuffed or pickled in acid and regain its original brightness.

The metal is also beginning to be used for window frames, as, apart from its resistance to corrosion, the much higher tensile strength permits a lighter and more delicate frame.

German Exports Down and Imports Up in 1929

WASHINGTON, Dec. 31.—Total exports of iron and steel products from Germany in 11 months of 1929 were 4,709,243 metric tons, an increase of 616,436 tons over those of the corresponding period of 1928, amounting to 4,092,807 tons. Imports during the 11 months ended November, 1929, were 1,339,550 tons, a decline of 525,669 tons from the total of 1,865,219 tons for the corresponding period of 1928.

German Aluminum Duty Expected in Spring

HAMBURG, GERMANY, Dec. 30.—New import duties on aluminum have been adopted by the Government and it is expected that the Minister of Finance will apply them on all shipments arriving after April 30. The new duties are intended to curtail the large volume of imports and especially the active Canadian competition in Germany. As the Government holds about 80 per cent of the stock of German aluminum producers, action for a higher duty was expected, but it is noteworthy that the producers have informed the Government that prices will not be advanced beyond the world market level.

The new duties on aluminum are as follows per 100 kg.: Ingots, 25 m. ($5.95); wire, 75 m. ($17.85); semi-finished aluminum, 37 m. ($8.80); powdered aluminum, 80 m. ($19.04); aluminum scrap, except turnings, 20 m. ($4.76); and turnings, 12 m. ($2.85).

British 1929 Steel Output Exceeds Recent Years

LONDON, ENGLAND, Jan. 13 (*By Cable*).—Output of pig iron in December was 643,000 gross tons and that of steel ingots and castings was 612,000 tons. This brings the 1929 total to 7,579,500 tons for pig iron and 9,605,500 tons for steel.

Comparison of the 1929 output with other periods shows that last year a higher tonnage, both in pig iron and in steel, was attained than Great Britain has experienced in some years.

	Pig Iron, Gross Tons	Steel Ingots and Castings, Gross Tons
1913—Av. monthly..	855,000	638,600
1920—Av. monthly..	669,500	755,600
1922—Av. monthly..	408,500	490,100
1923—Av. monthly..	620,000	706,800
1924—Av. monthly..	609,900	685,100
1925—Av. monthly..	519,700	616,400
1926—Av. monthly..	203,500	296,700
1927—Av. monthly..	607,800	758,200
1928—Av. monthly..	550,900	710,400
1929—Av. first half..	599,600	813,800
1929—October	688,700	889,800
1929—November	631,400	815,000
1929—December	643,000	612,000
1929—Av. monthly..	631,600	800,600

Japanese Steel Mills May Buy Pig Iron Jointly

YOKOHAMA, JAPAN, Dec. 17.—Steel mills in Japan are considering buying pig iron cooperatively. Importers of Indian pig iron point out that, regardless of how the mills fill their requirements, at least 30 per cent of the iron bought will be of Indian origin. For 1930, the steel mill consumers of pig iron estimate their requirements at 336,000 tons, although the present policy of retrenchment throughout Japanese industry may reduce this total to about 300,000 tons.

Sellers of Indian pig iron are of the opinion that, even with the smaller estimated consumption, they will furnish about 90,000 tons of pig iron during the year in addition to about 15,000 tons a month consumed by cast iron pipe makers and other consumers of foundry iron. On this basis they estimate Japan's imports of Indian pig iron for the current year at close to 200,000 tons.

Japan Seeks to Fill Own Rail Requirements

YOKOHAMA, JAPAN, Dec. 17.—The policy of the Seitetsu-Jo (Government Steel Works) of gradually reducing imports of foreign rails by steadily increasing its own production has been complicated by the retrenchment program of the present Government, which has led to abandonment of rail-

road expansion by the publicly controlled roads and curtailment in grants of new charters to private railroads. As a result, the Seitetsu-Jo is seeking foreign markets for its products and recently obtained a substantial order from the South Manchuria Railway Co. This purchase was not preceded by a formal inquiry on which foreign mills might submit bids.

With the Seitetsu-Jo seeking to monopolize the rail requirements of Japan and Manchuria, the International Rail Makers' Association has not been pressing for business, and its members have recently shown less interest than formerly in securing Japanese orders.

Cartel Agreement Expected to Bring About Mergers

HAMBURG, GERMANY, Dec. 30.—The terms under which the German Steel Syndicate were renewed, forbidding any member to expand production or enter into new lines of manufacture without the consent of the cartel, are expected to bring about an increase in mergers in 1930.

The Vereinigte Stahlwerke A. G., Düsseldorf, and the Friedrich Krupp A. G., Essen, which with two other companies recently acquired the Becker Steel Works, Sachsische Stahlwerke Dohlen, Bremerhute and Westfalische Stahl und Walzwerke A. G., are reported to have completed negotiations for the acquisition of another small producer, the Heinrichshütte of Hattingen. In some quarters it is suggested that by the end of 1930 there may be only six or, at the most, eight German steel interests, which will be cooperating as closely as possible.

Output of Thin Black Sheets Gaining

HAMBURG, GERMANY, Dec. 30.—German production of light-gage black sheets shows a steady increase. The average monthly output in September, October and November of Nos. 21 to 29 gage was 41,700 metric tons and the average production of No. 30 gage and lighter in this period was 8100 tons a month. The rate for these products was 7 per cent above that of 1928 and 13 per cent above that of 1927.

Again Selling Through Exporters

HAMBURG, GERMANY, Dec. 30.—Inquiries recently made among Belgian and German manufacturers of heavy hardware indicate that direct trading with overseas consumers, which has been greatly favored in the post-war years, is beginning to be abandoned. In a number of cases manufacturers are turning to exporters in London, Hamburg and other cities for this trade. The change is attributed generally to the losses experienced by many companies during the price decline in the spring and summer of 1929.

European Foundry Practice Reviewed

Observations on the trip of American foundrymen to some of the European foundries, in connection with the Third International Foundrymen's Congress in June, 1929, have been published by the Whiting Corporation, Harvey, Ill., in a four-page leaflet. They represent the substance of the address which R. S. MacPherran, chief chemist, Allis-Chalmers Mfg. Co., Milwaukee, presented at a recent meeting of the Chicago Foundrymen's Club. Comparisons of American and European foundry practice are interestingly discussed and some valuable comments on Perlit iron are included.

May Form Steel Export Committee

HAMBURG, GERMANY, Dec. 30.—Establishment of a special steel export committee is being considered by the German steel industry. This committee would study market requirements abroad, obtain details of large inquiries, extend aid to smaller mills in their export trade, given trade references and compile credit information on customers in overseas markets.

German Group Buys Steel Plant in Rumania

HAMBURG, GERMANY, Dec. 30.—A German group with which the Vereinigte Stahlwerke (United Steel Works) is associated has acquired a majority of the stock in the only steel mill in Rumania, the Reschnitza works. The works, which produces pig iron and steel, will be modernized and expanded to supply a larger part of the iron and steel requirements of Rumania.

"Recommended Methods of Sampling and Analysis of Foundry Materials" has been issued by the British Cast Iron Research Association as Research Report No. 72 under date of August, 1929, comprising 16 pages.

Canadian Firms Organize for Research

Metal manufacturing firms of Ontario, Canada, 46 in number, have organized the Ontario Metal Industries Research Association, to avail themselves jointly of the laboratory facilities of the Ontario Research Foundation.

A modern chemical and metallurgical research building is now nearing completion which is to house the special laboratories for this research. O. W. Ellis will direct the work of the metallurgical division. After studying at Birmingham University, he was chief metallurgist at the Royal Ordnance Factories, Woolwich, England, later coming to Canada as assistant professor of metallurgical engineering at the University of Toronto. Since that date he has been associated with the Mellon Institute of Industrial Research in Pittsburgh and the research department of the Westinghouse Electric & Mfg. Co. in the same city.

Briefly, the plan of operation is that the Ontario Research Foundation, with Dr. H. B. Speakman as director, will provide laboratories, staff and facilities. Overhead and general expenditures of the experimental work are to be borne by the metal industries, through the new organization.

Active direction of the new organization is completely in the hands of the industries themselves. R. W. Gifford of the Massey-Harris Co., Ltd., Toronto, has been selected as chairman; J. J. Ashworth of the Canadian General Electric Co., Ltd., as honorary treasurer. Ralph Skelton is secretary.

Actual membership covers a wide range of manufacturing activity. Firms connected with practically every phase of the metal industries in Ontario are represented. The gist of the scheme lies in the fact that, with research an admitted necessity for present-day industrial progress of every sort, many firms are unable to assume the heavy financial burdens necessary in order to carry on the required work individually. By means of membership in the Research Association, they can take advantage of complete testing and investigative facilities at an expenditure which is only nominal.

Locomotive, Stoker and Trackwork Shipments

	December, 1929	November, 1929	December, 1928
Railroad locomotives shipped(a)	67(b)	95	44
Do., in full year	850	.....	550(c)
Whereof, electric, total	39(c)	.....	96
Do., exported, total	104	.....	91
Unfilled orders, end of month	490(d)	398	282
Trackwork shipped for T-rail track(e), net tons	10,826(f)	11,326	11,061
Do., in full year	162,115(g)	.....	139,645
Mechanical stokers sold(a), number	79(h)	107	102
Do., horsepower	44,976	39,469	49,212
Do., in full year	599,585(j)	.....	508,688

(a)United States Department of Commerce. (b)Smallest since last April. (c)Smallest since the reports began, in 1920. (d)Largest since last July. (e)American Iron and Steel Institute. (f)Smallest since last January. (g)Largest since 1926. (h)Smallest since January, 1928. (j)Largest since 1923.

A. I. FINDLEY
Editor

THE IRON AGE

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W. W. MACON
Managing Editor

Individual and Corporate Spending

BUSINESS activity this year will be influenced in opposite directions by two factors, the disposition of corporations to spend money and the disposition of individuals to spend money. There is a new set of circumstances, decidedly different from those which existed at previous times when the general course of business took an unfavorable turn.

Corporations will spend much money in improvements this year and there are various reasons for their doing so. Economists who claim that the amount of capital was not altered in connection with the stock market collapse may be technically correct according to the precise definition of "capital" adopted, but this is a practical world and there are different kinds of capital.

Many corporations had surplus capital in the form of cash and much of it was loaned in the stock market at very remunerative rates. It is reasonable to conclude that large amounts have been returned and now lie idle, prompting the corporations to invest it in improvements, not so much improvements to increase output as improvements to reduce cost. Making an improvement that will yield, let us say, 6 per cent is an attractive proposition this year, whereas last year lending the money in Wall Street at a much higher rate was more attractive.

Corporate expenditures may always be divided into two general classes, for increase of output and for reduction of cost, respectively. It is readily recognized that expenditures nowadays run to a greater percentage of the latter than in the old days, when industries were growing rapidly and adding units was the principal means. This change makes a great change in the disposition to spend money when general trade has taken an unfavorable turn. In the old days it was natural to curtail because obviously increased output was not needed, whereas when cost reduction is the objective an unfavorable turn encourages expenditure.

There is also a new factor in that trade conditions are better understood and men do not fear that there will be an indefinitely long depression, with continually decreasing construction costs. Rather they are likely to be moved to take advantage promptly of the opportunities.

Increased corporate spending in 1930 is easily conceivable and altogether probable. But the influences as to individual spending are in the other direction. Economists may say that the collapse of the stock market did not decrease capital, but the practical point with individuals, considering those who lost paper profits, is this, that with a large paper profit the individual was prompted to spend freely his current income and quite likely some of his expected income. Now, even with that income intact, he will nevertheless spend less. Such a change is one of plain necessity. In addition there is the change of mental attitude. People like to follow the style, and it was the style to spend money, to buy a new automobile and to spend in other ways. That style is now materially altered.

Thus we have two trends, in opposite directions. Among the many factors that will influence the general course of trade they are important, and to an extent they will be balancing.

Increasing Steel Capacity

THE annual issue of THE IRON AGE recorded completion during 1929 of new open-hearth furnaces with 1,005,000 tons annual steel ingot capacity, the largest amount in any year since the war, and projects for 1930 involving 4,690,000 tons, or a much larger amount still. A general survey of our steel ingot capacity, recent and in prospect, is in order.

There have been substantial increases in capacity by way of old furnaces being enlarged, by better equipment being provided and by improvement in practice. For recent years these increases may be measured pretty closely. The mills have long reported their capacity but until five years ago under no very strict rules. Then the American Iron and Steel Institute set up a committee on the subject and a close ascertainment has since been made, beginning with that of capacity Dec. 31, 1925. The ascertainment for Dec. 31, 1929, has just begun, but a reasonably close approximation can now be made.

During the three years 1926, 1927 and 1928 the ascertained total steel ingot capacity increased by 5,914,433 tons, while the new furnaces reported as completed during those years totaled 2,390,000 tons, or only 40 per cent as much. More than half the total increase was by improvements, not outright new construction. Capacity as of Dec. 31, 1928, was 61,759,466 tons, roughly 83 per cent basic open-hearth, 2 per cent acid open-hearth, 14 per cent Bessemer and 1 per cent electric, crucible capacity being insignificant.

That the capacities were approximately correct in actual practice is shown by the fact that last May, the month of maximum production, Bessemer output was at 96 per cent and open-hearth at a fraction of 1 per cent over capacity. As there was some idleness, at least of acid open-hearth, one may take it that under pressure normal capacity was slightly exceeded.

In the three years for which comparison can be made, the increase in open-hearth capacity apart from complete new construction averaged about 1,200,000 tons a year. We may take it that in 1929, on account of pressure day by day for deliveries during much of the year, there was less improvement of that character than usual, and allow, say, 750,000 tons. This, with 1,005,000 tons of complete new construction just reported, gives us about 63,500,000 tons total steel ingot capacity Jan. 1, 1930. We may assume more rebuilding and other improving this year, say 1,200,000 tons, and allow only half of the projects to be put into actual service during the year. That would give us about 67,000,000 tons for the end of this year.

The sum total of capacity will thus be well in excess of prospective requirements in the near future. Largest production in a calendar year has fallen just short of 55,000,000 tons, in 1929, while largest production in 12 consecutive months was in the neighborhood of 56,750,000 tons, in the 12 months through last September, and the highest rate, that of last May, was a shade under 61,000,000 tons.

This, of course, points to the abandonment of some capacity, for no little of the existing capacity is old and has not been brought up to date. This discarding will be in Bessemer as well as open-hearth, as there is a continuance of the long trend away from Bessemer steel.

Dull Days for Other Metals

IN copper, a state of unstable equilibrium exists. American producers have been able to peg the price of the metal at a point which is high enough to promise good operating profits, yet hardly high enough to drive customers into the use of substitutes. Still it is high enough to restrict a healthy expansion into new fields of usefulness. Furthermore, to maintain this price it has been necessary to curtail production, and this has placed the "porphyry coppers" (which must operate at a high rate in order to make money from an extremely low-grade ore) in an uncomfortable position. Furthermore, American domination of the world copper market is threatened by the commercial development of bonanza deposits in Central Africa.

By-product zinc is appearing on the market in greater and greater tonnage. Over a year ago THE IRON AGE commented editorially upon the happy situation at last reached by the owner of a complex copper-lead-zinc deposit. Differential flotation now enables him to separate it into clean concentrates of copper, lead and zinc sulphides. He now has three products, each of which can be sold at a profit, whereas formerly he had nothing but an ore almost worthless for direct smelting. It is too much to expect an owner of such a deposit—and they are very numerous indeed in the West—to exercise restraint after so many years of disappointing financial experience. He can not only make zinc cheap, but (by means of electrolytic refining) make it superlatively good. No wonder a recent note in the news summary published on our final page indicated that the district centering around Joplin, Mo., a region of rich ore in thick beds close to the surface, is operating on a 40 per cent basis.

Tin has been declining in price for the last three years, and stocks in warehouses gradually increasing. Correct information on production, consumption and spot supply is lacking, but here apparently we have the working of the law of supply and demand. Producing units are very numerous, unorganized and non-cooperating. An excess supply has caused a decline in price, but increased consumption has not yet caught up with current production. Low costs in turn have caused severe business depression throughout all Bolivia (where tin is the important export), started an agitation for mining restrictions by the Government of the Federated Malay States, and eliminated profits to mining companies well supplied with expensive dredging equipment. Cornish mines have agreed to work no Sundays during 1930, and to close down a full week in January and February.

Last week we noted a record low in the price of silver. The "16 to 1" hope of free silver days has proved as illusory as some more recent profits in stock speculation. At the lowest quotation of 44c. per troy ounce the ratio is more like 46 to 1. Here, again, is the influence of overproduction of by-product metal (every pound of refined copper and lead is relieved of its modicum of silver). What this price is doing to the silver currency, and the cost of living in China, India and Mexico, and to the silver mines of the world, can be readily inferred.

Lest the combined outlook be regarded as unduly pessimistic, we hasten to say that the situation as a whole should not be unduly depressing. At the end of a period of excessive production we find ourselves capable of making more metal than we can absorb conveniently. But the rate of absorption is continually increasing and the number of absorbers growing at an even faster rate. Therefore it is only a matter of a few months or years until this excess capacity will have vanished. Those industries which are well enough organized to discover and exploit new uses for the product (aluminum is an example *par excellence*) are in the best position. Those, like tin and silver, which drift with the tide, will remain the victims of circumstances until they reform and get into step with the procession.

More Chance for the Job

BACK in 1928, a good while before the stock market mania was at its worst, THE IRON AGE suggested that many men were giving too much attention to speculation, in not a few cases to the detriment of their own business or that which others had committed to their care. As speculation grew faster and more furious and the paper profits mounted, there was increasing evidence of distaste for the slower processes and profits of every-day business. Many preachers of the new era were free in announcing their preference for the quicker route they had found to wealth. And this at a time when long-established businesses, with conditions rapidly changing in respect to production, competition and demand, were calling for the hardest thinking and the most diligent oversight from those in charge. It is probably only sober truth to say that for the good of many men, as well as of some neglected businesses, the stock market collapse came none too soon.

In a current syndicate article B. C. Forbes quotes "the head of one of New York's most famous banking

institutions" on what the country has gained by the pricking of the speculative bubble. This president regards the October-November collapse as the best thing that could have happened to the nation. The craze for speculation, he says, was playing havoc with the people; it was "undermining character, overthrowing fundamental principles, poisoning straight thinking, and creating a totally false attitude toward life." Then illustrating from his own experience:

> Men with sons ready to take up their life work used to talk over with me the possibilities in different lines of mercantile or industrial activity. Very often they wanted their sons to follow in their own business footsteps. In any case, their sole thought was to get them into some useful walk of life which held promise for the future.
>
> But within the last two years a distinct change has come over the attitude of many parents. They want their sons—and the sons apparently want—to get into the speculative game in Wall Street.
>
> The idea has spread that it is too slow a process to make money in ordinary business ways, and that the quickest and surest short-cut to wealth is to get into the thick of stock market gambling.
>
> Now, this is bad, as bad as it can be. It is tragic to raise up the oncoming generation in the belief that success is not to be won by long years of studious preparation and hard toil, but by plunging into Wall Street and getting neck-deep in the stock market game, as the young fellows call it. The men who come to see me with this idea in mind belong usually to what has been the most substantial class of citizens in the country, men who have made more than ordinary progress in the world.

Probably every reader of the above could cite from his own contacts one or more instances of the hurtful effect of the speculative epidemic of 1928 and 1929. Without doubt the late boom in security values was the most demoralizing the country ever knew. The speculative factor will always exist in business. Transactions must be made involving the uncertainties of a future six months, twelve months, two years, five years. But speculation in business and speculation as a business are two very different things.

As the New York banker observed, "the stock market game" was impressing itself upon the country "as the most important thing of all, as a glorious and glittering end in itself, as the one most attractive and most certain way of reaping richly without any preliminary sowing." And that many young men were led to think of such speculation as a career and as an easy road to wealth was one of the greatest dangers of this most unhealthy of all booms. We may look to see abundant evidence in the course of trade in 1930 that the rewards of business are still going in more than ninety-nine cases out of a hundred to those who are willing to pay for them in the coin of hard work and who entertain no dream of a quick and easy road to fortune.

CORRESPONDENCE

Molybdenum in Cast Iron

To the Editor: In the Dec. 5 issue of your paper is a very interesting article entitled "Molybdenum in Cast Iron" by E. K. Smith and H. C. Aufderhaar. We have done considerable work with molybdenum ourselves and are using it daily.

The objection to most scientific articles of this kind is that, when the practical costs of these alloys are mentioned, the conditions in the foundry are entirely overlooked. THE IRON AGE goes to many users of castings and when we, as sellers of castings, charge the extra cost for an alloy like molybdenum, we are confronted with such articles which set forth that the molybdenum can be added for the cost of the alloy alone, namely $40 per ton. This entirely overlooks the fact that it is impossible to save all of the alloy in the material that is remelted and especially so in cupola operations even under the most ideal conditions.

Furthermore, the average foundry must alloy by ladle addition unless it is selling its entire product to one customer who uses only one mixture. In that case the alloy that gets into the gates and returns can be salvaged to a large extent, but even then not 100 per cent.

To make a correct calculation of what the ladle addition costs, we must calculate the yield. To use the example that the authors set forth, 2 per cent molybdenum added to cast iron would require 40 lb. of metal in a ferroalloy for a ton of molten metal, but with a 70 per cent yield, this would result in only 1400 lb. of salable castings. Dividing $40 by 1400 (lb.) would give us a cost of 2.85c. per lb. of castings. This figures to an additional cost of approximately $57 per ton of castings when alloyed with 2 per cent molybdenum. Customers are inclined to feel that they are being overcharged at this rate, even if they order only a few sample castings.

It is the writer's belief that if any article of this kind is going to mention costs at all it should tell the whole story, or at least quote the costs under the most ideal cupola conditions. In my opinion a foundryman would have to account for at least 4 per cent melting loss (probably more than that would be lost in drops and gates that never get back to the charging floor). Agencies pushing the sale of a particular alloy, in their anxiety to sell the users of castings, are inclined to quote cost figures which are so ideal that they cannot be reached, and in that way make it increasingly difficult for foundries to sell the castings containing their alloy.

Except for this criticism we found the article very helpful and not too scientific.

WILLIAM J. GREDE,
President, Spring City Foundry Co.

Waukesha, Wis.

Notable Service Records in Commonwealth Foundry

Of the more than 4000 men on the payroll of the Commonwealth Division of the General Steel Castings Corporation, Granite City, Ill., 1698 have a service record of five years or more, representing 15,000 years of work and experience. Of this group, 25 men have a record of 25 years or more; 66 men have been with the company between 20 and 25 years; 162 between 15 and 20 years; 317 between 10 and 15 years; 1128 between 5 and 10 years.

Recently 2500 Commonwealthers and their families met in the building where large locomotive bed castings are finished, when these men received checks according to the service group in which they belonged.

National Steel's Western Mill to Be at Gary

The National Steel Corporation, through its subsidiary the Weirton Steel Co., Weirton, W. Va., whose decision to build a mill in the Chicago district was mentioned in THE IRON AGE last week, has purchased a large tract of land for this purpose at Gary, Ind., according to a statement by E. T. Weir, chairman of the National and Weirton companies. No decision has yet been reached as to when the mill will be begun, nor has anything definite been decided as to the type of product to be manufactured. It is certain, however, that no project in the Chicago district will be undertaken until the completion of the plant of the Great Lakes Steel Corporation in Detroit, and until the expansion program at Weirton, now under way, is finished. It is not unlikely, however, that the company's Gary mill will be a fully integrated unit with blast furnaces, open-hearth furnaces and rolling mills.

With the completion of the organization of the National Steel Corporation, the ore and blast furnace properties of the M. A. Hanna Co., Cleveland, which became a part of the merger, will be known as the Hanna Furnace Co., merchant pig iron division of National Steel Corporation.

World Shipbuilding Is Now Greatest Since the War

The volume of world shipbuilding is now at the highest point reached since the end of 1927, and is almost at a level with the rate of production just before the war, says a statement just issued by Lloyd's Register of Shipping, covering returns from all maritime countries for the three months ended Dec. 31, last. With the exception of the total at the close of 1927, which was only 8000 gross tons more than the present figure of 3,110,000 tons, the current aggregate is the largest since the end of the war-building boom in ship construction.

As compared with the previous quarter, ended Sept. 30, 1929, the present total shows a gain of nearly 300,000 gross tons. For Great Britain and Ireland an increase of over 110,000 tons is shown; and for the United States, of 67,000 tons; with smaller gains for Germany, Holland, Japan, France, Russia, Denmark and Italy. The only decline reported to Lloyd's Register is one of about 20,000 tons for Sweden.

Geuder, Paeschke & Frey Co., Milwaukee, manufacturer of sheet metal and enamelled ware, celebrated its golden jubilee Jan. 7 with a dinner for the officers and other executives. The company was founded by Charles A. Paeschke and Frank J. Frey, now president and vice-president respectively, of the company, both of whom were present, and by the late William Geuder.

The Week in Business

Drift of Current Financial and Economic Opinion

SALES on the New York Stock Exchange on Jan. 13—1,452,000 shares—were the smallest for any five-hour day since the third week of July, 1928.

The stock market may remain sluggish for some time, according to the Bache *Review*, since the "course of prices will be dominated by the outlook for business more than any other factor." Further liquidation of accounts will take place—"some of it originating through widely scattered country banks where probably many stocks were being carried for customers before the break, with more added where margin-account customers had to be helped out by their own banks."

The course of business in the next few months remains an unanswered question, but Alexander D. Noyes, New York *Times*, says that "there is at least as much to say in favor of early and emphatic recovery . . . as there is to say against it."

The fact that business recession already has gone rather far, as reflected in such important indexes as iron and steel production, building, automobile manufacture and railroad carloadings, is regarded as a favorable omen.

Instalment Selling as a Business Restorative

Believing that the worst is over, several commentators confidently announce that instalment selling has stood the test of depression. In fact, the deferred payment plan is the best instrument available to accelerate business recovery, according to Paul M. Mazur, Lehman Brothers, New York, writing in the New York *Evening Post*.

"We think of deferred payments as a credit problem," he says, "whereas it serves its greatest function as a sales agency."

He points out that neither tax reduction nor the expenditure of a few billion dollars for public works and utility improvements can alter the trend of business in a country with total annual expenditures of nearly one hundred billion dollars. Nor can unemployment be prevented by persuasion.

"Of all the constructive factors," he declares, "the urge to buy is the most encouraging. Once a certain standard of life is reached by an individual there is apparently a strong desire to maintain that standard. . . . After all . . . we have been spending annually for advertising $1,500,000,000 educating people to consume, and the results of that particular curriculum are not going to be wasted in a few months."

Mr. Mazur is not concerned over a possible increase in replevined goods through defaults on instalments, since that would mean "a capital loss which industry can handle adequately."

Unemployment Danger Passed?

The danger of a flood of defaults is dismissed by C. W. Steffler in *Commerce and Finance*, who says: "Since general unemployment, formerly the invariable concomitant of depression, has not yet raised its insidious head, it is unlikely to develop to any degree during the remainder of the present recessionary period."

The *Financial Chronicle* points out, however, that wages and unemployment less than a quarter of a year after the break in stocks have not had time to show a serious reduction, if there is to be one. Some shrinkage in employment has already taken place, the decline for factory labor in the State of New York having been almost 4 per cent in December, following a drop of 2 per cent in November—the sharpest recession since 1920.

Borrowing From the Future

Forms of credit may be used excessively as a business restorative, in the opinion of the *Financial Chronicle*. "There is no doubt," it declares, "that in pushing ahead too fast in our business relations, we produce many of the complexities that threaten us—that prevent us from seeing clearly into the future. A little more of the 'pay as you go' policy would tend to stabilize trade. Is it not a fact that both our 'prosperity' and 'pleasure' are filched from the future by private, corporate and municipal borrowing?"

Iron and Steel Markets

Prices Are Lower as Output Rises

Steel Specifications Gain and Mill Operations Expand— Declines in Plates, Shapes, Wire Nails, Black and Galvanized Sheets

DEMAND for steel continues to grow and production has made another gain, but prices have undergone further reductions.

With business on the mend, the downward revision of prices is interpreted as an effort to stabilize a market that had been subject to widespread irregularities. The temptation to make concessions was strong during a period when the dearth of prompt specifications forced frequent roll changes and intermittent mill operations, but with releases growing in volume producers believe that a steadier price situation is at hand.

Both of the leading producers are now making raw steel at the rate of 70 per cent of capacity, compared with 65 per cent last week and as low as 40 per cent in the closing week of 1929. This recovery is impressive, since buyers are still cautious and limiting specifications to nearby needs. As these requirements gain, the industry is less conservative in appraising business prospects and confidently predicts further improvement, particularly in heavier rolled products.

In the Chicago district, where steel ingot output is now 65 per cent of capacity, compared with 60 per cent a week ago, two banked steel works blast furnaces have been put into commission and a 70 per cent rate for next week is predicted. The entire Greater Pittsburgh area, including the Youngstown and Wheeling districts, is now on a 65 per cent basis, following sharp gains in the Valleys and among the smaller companies around Pittsburgh. Average ingot output for the country at large is also placed at 65 per cent.

Mill prices on plates and shapes have declined $2 a ton to 1.80c., Pittsburgh. Bars, which have also been irregular recently, are now more firmly held at 1.90c. Reductions of $2 a ton have also been made on black sheets, galvanized sheets, fender stock and all wire products except wire rods, manufacturers' wire and woven wire fencing. Tie plates have been marked down $1.50 a ton to 2.07½c. a lb., mill.

On wire nails the new minimum quotation is $2.30 a keg, Pittsburgh or Cleveland; on black sheets, 2.65c. a lb., Pittsburgh; on galvanized sheets, 3.30c., Pittsburgh; on fender stock, 4.15c., Cleveland or Pittsburgh.

The Steel Corporation's gain of 291,848 tons in unfilled orders in December is explained in large part by the decline in shipments during that month. In many instances specifications were received for January rolling and it is also probable that caution dictated a very conservative operating rate. Steel producers were quick to adjust output to reduced demand and they were naturally anxious to avoid accumulating crude steel or pig iron so far as possible. One representative producer reports that December bookings exceeded output by 20 per cent.

Rail bookings have been augmented by orders for 107,000 tons. The Baltimore & Ohio bought 85,000 tons, the Soo Line divided 8000 tons among the Illinois Steel Co., Inland Steel Co. and the Bethlehem Steel Corporation, and the Central of Vermont placed 7000 tons with the Bethlehem company. Three small orders from Western lines accounted for 7000 tons additional. Rail specifications are expanding and Chicago mills are planning a further increase in output, now at 85 per cent of capacity.

Structural steel business is now affected by the customary midwinter lull, but fabricated steel awards total 27,500 tons, compared with only 7000 tons last week, and 23,000 tons has been added to the pending list.

Motor car builders are slowly stepping up production and will make a much better showing in February than in the current month. Steel releases from the automobile industry show a further increase, particularly in bars and sheets. At Cleveland, one of the leading sources of supply for automotive steel, the output of independent producers is now 65 per cent of capacity, compared with 30 per cent a few weeks ago. A leading Ohio producer of alloy steel has increased operations to about the same basis. However, it is estimated that the automobile industry is not yet taking more than 20 or 30 per cent of the steel that it uses during peak operations.

Scrap markets are buoyant, although characterized by fewer advances than in recent weeks. At Pittsburgh the pressure on the part of dealers to buy material has subsided.

Pig iron demand is showing gradual improvement, both in terms of sales and shipments, but price uncertainty is still a factor in some districts. In the South the operations of the leading melters, the cast iron pipe shops, are expanding, following heavier buying by utilities and municipalities; yet there is considerable carryover iron from the fourth quarter and furnace shipments, although growing, are still short of production. Southern foundry iron has been sold in the Chicago district at $13, Birmingham. The sale of 20,000 tons of surplus steel works pig iron at a concession of $1 a ton from the ruling price at Chicago furnace has also accentuated competition in that territory. At Buffalo, prices on iron for local distribution have been reduced $1 a ton.

THE IRON AGE composite price for finished steel has declined from 2.362c. to 2.319c. a lb., the lowest figure since July, 1928. The pig iron composite is unchanged at $18.21 a gross ton.

A Comparison of Prices

Market Prices at Date, and One Week, One Month and One Year Previous, Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron, Per Gross Ton:	Jan. 14, 1930	Jan. 7, 1930	Dec. 17, 1929	Jan. 15, 1929
No. 2 fdy., Philadelphia	$20.76	$20.76	$20.76	$21.26
No. 2, Valley furnace	18.50	18.50	18.50	17.50
No. 2 Southern, Cin'ti	17.69	17.69	17.69	20.19
No. 2, Birmingham	14.50	14.50	14.50	16.50
No. 2 foundry, Chicago*	20.00	20.00	20.00	20.00
Basic, del'd eastern Pa	19.50	19.50	19.50	19.75
Basic, Valley furnace	18.50	18.50	18.50	17.50
Valley Bessemer, del'd P'gh	20.76	20.76	20.76	20.01
Malleable, Chicago*	20.00	20.00	20.00	20.00
Malleable, Valley	19.00	19.00	19.00	18.00
L. S. charcoal, Chicago	27.04	27.04	27.04	27.04
Ferromanganese, furnace	100.00	100.00	100.00	105.00
Rails, Billets, Etc., Per Gross Ton:				
Rails, heavy, at mill	$43.00	$43.00	$43.00	$43.00
Light rails at mill	36.00	36.00	36.00	36.00
Rerolling billets, Pittsburgh	34.00	34.00	35.00	33.00
Sheet bars, Pittsburgh	34.00	34.00	35.00	34.00
Slabs, Pittsburgh	34.00	34.00	35.00	33.00
Forging billets, Pittsburgh	39.00	39.00	40.00	38.00
Wire rods, Pittsburgh	40.00	40.00	40.00	42.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb	1.85	1.85	1.85	1.90
Finished Steel,				
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Bars, Pittsburgh	1.90	1.90	1.90	1.90
Bars, Chicago	2.00	2.00	2.00	2.00
Bars, Cleveland	*1.85*	1.90	1.90	1.90
Bars, New York	2.24	2.24	2.24	2.24
Tank plates, Pittsburgh	*1.80*	1.90	1.90	1.90
Tank plates, Chicago	2.00	2.00	2.00	2.00
Tank plates, New York	2.07½	2.12½	2.17½	2.17½
Structural shapes, Pittsburgh	*1.80*	1.90	1.90	1.90
Structural shapes, Chicago	2.00	2.00	2.00	2.00
Structural shapes, New York	2.09½	2.09½	2.09½	2.14½
Cold-finished bars, Pittsburgh	2.20	2.20	2.30	2.20
Hot-rolled strips, Pittsburgh	1.80	1.80	1.90	1.80
Cold-rolled strips, Pittsburgh	2.65	2.65	2.75	2.85

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

Finished Steel,	Jan. 14, 1930	Jan. 7, 1930	Dec. 17, 1929	Jan. 15, 1929
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 24, P'gh	*2.65*	2.75	2.75	2.85
Sheets, black, No. 24, Chicago dist. mill	2.85	2.85	2.75	2.95
Sheets, galv., No. 24, P'gh	*3.30*	3.40	3.40	3.60
Sheets, galv., No. 24, Chicago dist. mill	3.50	3.50	3.50	3.70
Sheets, blue, No. 13, P'gh	2.25	2.25	2.35	2.10
Sheets, blue, No. 13, Chicago dist. mill	2.45	2.45	2.45	2.20
Wire nails, Pittsburgh	*2.30*	2.40	2.40	2.65
Wire nails, Chicago dist. mill	*2.35*	2.45	2.45	2.70
Plain wire, Pittsburgh	2.40	2.40	2.40	2.50
Plain wire, Chicago dist. mill	2.45	2.45	2.45	2.55
Barbed wire, galv., Pittsburgh	*2.95*	3.05	3.05	3.30
Barbed wire, galv., Chicago dist. mill	*3.00*	3.10	3.10	3.35
Tin plate, 100 lb. box, P'gh	$5.25	$5.25	$5.35	$5.35
Old Material, Per Gross Ton:				
Heavy melting steel, P'gh	$16.75	$16.75	$15.25	$19.25
Heavy melting steel, Phila	14.50	14.50	14.50	16.00
Heavy melting steel, Ch'go	12.75	12.75	12.50	14.75
Carwheels, Chicago	13.75	13.75	13.50	14.00
Carwheels, Philadelphia	15.00	15.00	15.50	16.50
No. 1 cast, Pittsburgh	14.50	14.50	14.50	16.00
No. 1 cast, Philadelphia	15.00	15.00	15.00	16.25
No. 1 cast, Ch'go (net ton)	13.50	13.50	13.50	15.75
No. 1 RR. wrot., Phila	15.00	15.00	15.50	15.50
No. 1 RR. wrot., Ch'go (net)	12.00	12.00	12.00	13.25
Coke, Connellsville,				
Per Net Ton at Oven:				
Furnace coke, prompt	$2.60	$2.60	$2.65	$2.75
Foundry coke, prompt	3.50	3.50	3.75	3.75
Metals,				
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York	18.12½	18.12½	18.12½	16.87½
Electrolytic copper, refinery	17.75	17.75	17.75	16.50
Tin (Straits), New York	*38.75*	39.62½	41.37½	49.00
Zinc, East St. Louis	5.20	5.30	5.50	6.35
Zinc, New York	5.55	5.65	5.85	6.70
Lead, St. Louis	6.10	6.10	6.10	6.50
Lead, New York	6.25	6.25	6.25	6.65
Antimony (Asiatic), N. Y.	**8.50**	8.37½	8.50	9.50

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

Pittsburgh

Prices Decline on Plates, Shapes, Black and Galvanized Sheets and Merchant Wire Products

PITTSBURGH, Jan. 14.—Improved specifications for practically all the principal steel products during the last week have offset to a certain extent a market situation which is seriously affected by restricted new buying and price weakness. In December, steel company operating departments underwent the test of drastically curtailed output, and this month the stress has been transferred to the sales end of the business.

For several weeks before the end of the year, the price structure was subject to constant pressure from certain large consuming industries, and since Jan. 1 leading flat-rolled tonnage products, including blue annealed sheets, strip steel and tin plate, have declined $2 a ton. In the last week leading makers have recognized concessions of 10c. per 100 lb. on nails and other merchant wire products. The heavy hot-rolled products are finally feeling the strain of continued price concessions, and plates and shapes may now be bought in comparatively small tonnages in this district for less than 1.90c., Pittsburgh, the price which has prevailed for three or four months.

The 1.90c., Pittsburgh, price on bars has held somewhat better than have plate and shape prices, and many bar makers have the majority of their customers under contract at this figure. Nevertheless, this price has been shaded on spot sales and a buyer of 1000 tons or even less would have little difficulty in placing the business with a Pittsburgh mill at 1.85c.

Steel works operations continue to improve, and ingot output in the Greater Pittsburgh district, including Youngstown and the Wheeling area, now average fully 65 per cent of capacity. Sharp gains have been registered in the Valleys, and the smaller independent companies around Pittsburgh are continuously adding open-hearth furnaces to their active lists. Tin plate schedules are also higher, estimated this week at fully 75 per cent of capacity, and sheet mills are running at better rates.

Current tonnage releases in some departments are somewhat ahead of operating rates, but mills hesitate to improve schedules too rapidly. It is admitted that a good portion of the specifications now reaching mills represent only urgent needs of consumers, and a continued increase in tonnage in the proportion which has prevailed since the first of the year is not expected.

The pig iron market continues dull, although shipments are gradually improving. Scrap is marking time, following sharp price advances in the last week or two, and has gained little added strength in the last few days.

Pig Iron.—Buying continues to improve, although small-lot purchases still predominate. Sales of 1000 tons or more have been exceptional in the last two weeks, but some sellers report their aggregate tonnage as having been fairly satisfactory. Shipments are becoming more regular, and most of the foundries in this district are now taking iron on contract in limited tonnages. Some of them are not even contracting for their requirements, but are merely ordering a few cars from week to week as their business warrants. The Na-

tional Radiator Corporation has not yet closed on its foundry iron for New Castle, Pa., and other general market inquiries are lacking. The Standard Sanitary Mfg. Co. is expected to come into the market for its Pittsburgh plant in the near future. Users of basic iron are apathetic toward their future needs, as non-integrated steel companies which buy this material have considerable iron still coming to them on fourth quarter contracts. This iron was not specified on account of reduced steel operations. Steel foundries are taking shipments in fair volume, and the same is true of malleable plants. Nothing has occurred to change the price situation, and basic and foundry iron are still quotable at $18.50, Valley, with malleable and Bessemer at $19. The Cherry Valley furnace of the Davison Coke & Iron Co. went into blast on Jan. 9, and the Shenango Furnace Co. put in its No. 3 stack on Jan. 11. The Struthers furnace in the Valley is operating, and the Youngstown Sheet & Tube Co. plans to light one of its Hubbard stacks in the near future. The Neville Island furnace at Pittsburgh will go out this week.

Prices per gross ton, f.o.b. Valley furnace:

Basic	$18.50
Bessemer	19.00
Gray forge	18.00
No. 2 foundry	18.50
No. 3 foundry	18.00
Malleable	19.00
Low phos., copper free	27.00

Freight rate to Pittsburgh or Cleveland district, $1.76.

Prices per gross ton, f.o.b. Pittsburgh district furnace:

Basic	$19.00
No. 2 foundry	19.00
No. 3 foundry	18.50
Malleable	19.50

Freight rates to points in Pittsburgh district range from 63c. to $1.13.

Semi-Finished Steel.—Shipments improved again last week and specifications from non-integrated makers of sheets, strips and tin plate are fairly satisfactory, considering the comparatively low operating rate of the industry. Sales are not numerous, and buyers are slow in contracting for future requirements. Open price declines in finished steel products have made the smaller rolling mills more dissatisfied than before with the prices on billets, slabs and sheet bars, and many of them are holding out for lower quotations. The present $34 price is higher than the quotations on semi-finished steel one year ago, while finished steel prices are no higher, and in some cases lower than they were early in 1929. The official quotation on wire rods is unchanged at $40, although nail prices have receded $2 a ton, and related merchant lines have followed. Many users of wire rods are under contract at $40, and pressure for reduction of this figure would meet with stubborn resistance from the mills.

Bars, Shapes and Plates.—Specifications during the last two weeks on the heavy hot-rolled products have been sufficient to justify a considerably higher operating rate than the present, but two weeks' tonnage does not make an order book, and mills are inclined to let small backlogs accumulate rather than boost the operating rate. The backlog of one structural mill in this district will be considerably improved by the letting of the Empire State Building in New York, requiring 53,000 tons of shapes, and other large projects placed during the last six weeks have contributed materially. Bids will be taken Jan. 28 on a bridge across the Ohio River at McKees Rocks, Pa., requiring 13,000 tons of structural steel, and other bridge work in this district will be coming out in the spring. An office building at Dayton, Ohio, taking 3100 tons, was awarded to a Pittsburgh district fabricator, while 1500 tons of plates and shapes will be required for 10 barges placed with a local yard. It is generally believed that new business would be considerably better if prices were stronger, but developments during the last week have been none too constructive, particularly in the case of plates and shapes. Makers of bars are taking a stronger stand on prices, but shading of $1 to $2 a ton has now become so common on plates and shapes that the market is quotable at 1.80c. to 1.85c. The bar market remains quotable at 1.90c., Pittsburgh, and although lower quotations are still being made occasionally, a large percentage of bar consumers have entered first quarter contracts at the full price. Preferential bar customers are less numerous than are those for plates and shapes, and large tonnages of merchant bars subject to competitive bidding are not so common. This can hardly be said of reinforcing bars, but demand for this commodity is restricted at this time of the year, and price weakness might be expected to be less pronounced.

Rails and Track Accessories.—Specifications for spikes, tie plates and other track accessories continue to be good, and with the rail laying season close at hand, demand may be expected to grow in volume. Quick shipments are the rule, and some makers of track accessories have accumulated fairly large stocks to accommodate rush orders. The Baltimore & Ohio has placed its 1930 rail requirements, and has also purchased tie plates sufficient for its rail laying program. Although the rail tonnage was not made public, the amount involved is said to be about 85,000 tons, considerably less than was purchased in 1929. Prices on track accessories are subject to some cutting, although the market is not quotably lower except in the case of tie plates, which have declined $1.50 a ton to $41.50.

Tubular Goods.—The pipe market continues seasonally quiet in nearly all lines, although specifications for mechanical tubing are reaching mills in somewhat better volume. The pipe industry is operating at about 40 per cent of capacity, but mill and warehouse stocks are low, and an improved rate may be expected in advance of spring demand. Reports from the oil country indicate that various conservation projects in view for 1930 will not seriously curtail the demand for pipe. Line pipe projects, which came out early in the fall, are still dormant, although some of the larger developments are expected to become active in the early spring.

Wire Products.—Quoted prices on wire nails and staples and annealed fence wire have been reduced $2 a ton by leading manufacturers, and nails are now quoted at $2.30 to $2.40, Pittsburgh, with fence wire at 2.45c. to 2.55c. These reductions, which apply only to the merchant trade, really amount to a recognition of quotations which have been common in the last

The Iron Age Composite Prices

Finished Steel

Jan. 14, 1930, 2.319c. a Lb.

One week ago	2.362c.
One month ago	2.362c.
One year ago	2.391c.
10-year pre-war average	1.689c.

Based on steel bars, beams, tank plates, wire, rails, black pipe and black sheets. These products make 87 per cent of the United States output of finished steel.

	High	Low
1929	2.412c., April 2;	2.362c., Oct. 29
1928	2.391c., Dec. 11;	2.314c., Jan. 3
1927	2.453c., Jan. 4;	2.293c., Oct. 25
1926	2.453c., Jan. 5;	2.403c., May 18
1925	2.560c., Jan. 6;	2.396c., Aug. 18

Pig Iron

Jan. 14, 1930, $18.21 a Gross Ton

One week ago	$18.21
One month ago	18.21
One year ago	18.46
10-year pre-war average	15.72

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

	High	Low
1929	$18.71, May 14;	$18.21, Dec. 17
1928	18.59, Nov. 27;	17.04, July 24
1927	19.71, Jan. 4;	17.54, Nov. 1
1926	21.54, Jan. 5;	19.46, July 13
1925	22.50, Jan. 13;	18.96, July 7

Mill Prices of Finished Iron and Steel Products

Iron and Steel Bars

Soft Steel

	Base per Lb.
F.o.b. Pittsburgh mill	1.90c.
F.o.b. Chicago	2.00c.
Del'd Philadelphia	2.22c.
Del'd New York	2.24c.
Del'd Cleveland	1.85c.
F.o.b. Cleveland	1.85c.
F.o.b. Lackawanna	2.00c.
F.o.b. Birmingham	2.05c.
C.i.f. Pacific ports	2.35c.
F.o.b. San Francisco mills	2.35c.

Billet Steel Reinforcing

F.o.b. Pittsburgh mills, 40, 50, 60-ft.	1.95c.
F.o.b. Pittsburgh mills, cut lengths	2.20c.
F.o.b. Birmingham, mill lengths	2.05c.

Rail Steel

F.o.b. mills, east of Chicago dist.	1.90c.
F.o.b. Chicago Heights mill	1.90c.
Del'd Philadelphia	2.27c.

Iron

Common iron, f.o.b. Chicago	2.00c.
Refined iron, f.o.b. P'gh mills	2.75c.
Common iron, del'd Philadelphia	2.12c.
Common iron, del'd New York	2.14c.

Tank Plates

	Base per Lb.
F.o.b. Pittsburgh mill	1.80c. to 1.85c.
F.o.b. Chicago	2.00c.
F.o.b. Birmingham	2.05c.
Del'd Cleveland	2.04c. to 2.09c.
Del'd Philadelphia	2.00c. to 2.10c.
F.o.b. Coatesville	1.90c. to 2.00c.
F.o.b. Sparrows Point	1.90c. to 2.00c.
F.o.b. Lackawanna	1.90c. to 2.00c.
Del'd New York	2.07½c. to 2.17½c.
C.i.f. Pacific ports	2.25c. to 2.35c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh mill	1.80c. to 1.85c.
F.o.b. Chicago	2.00c.
F.o.b. Birmingham	2.05c.
F.o.b. Lackawanna	1.95c. to 2.00c.
F.o.b. Bethlehem	1.95c. to 2.00c.
Del'd Cleveland	2.04c. to 2.09c.
Del'd Philadelphia	1.96c. to 2.06c.
Del'd New York	2.09¼c. to 2.14¼c.
C.i.f. Pacific ports	2.35c.

Hot-Rolled Hoops, Bands and Strips

	Base per Lb.
6 in. and narrower, P'gh	1.90c. to 2.00c.
Wider than 6 in., P'gh	1.80c. to 1.90c.
6 in. and narrower, Chicago	2.10c.
Wider than 6 in., Chicago	2.00c.
Cooperage stock, P'gh	2.20c.
Cooperage stock, Chicago	2.30c.

Cold-Finished Steel

	Base per Lb.
Bars, f.o.b. Pittsburgh mill	2.20c.
Bars, f.o.b. Chicago	2.20c.
Bars, Cleveland	2.20c.
Bars, Buffalo	2.20c.
Shafting, ground, f.o.b. mill	*2.55c. to 3.50c.
Strips, P'gh	2.75c.
Strips, Cleveland	2.65c. to 2.75c.
Strips, del'd Chicago	3.05c.
Strips, Worcester	2.90c.
Fender stock, No. 20 gage, Pittsburgh or Cleveland	4.15c.

*According to size.

Wire Products

(Carload lots, f.o.b. Pittsburgh and Cleveland.)

To Merchant Trade

	Base per Keg
Standard wire nails	$2.30 to $2.40
Cement coated nails	2.30 to 2.40
Galvanized nails	4.30 to 4.40

	Base per Lb.
Polished staples	2.75c. to 2.85c.
Galvanized staples	3.00c. to 3.10c.
Barbed wire, galvanized	2.95c. to 3.05c.
Annealed fence wire	2.45c. to 2.55c.
Galvanized wire, No. 9	2.90c. to 3.10c.
Woven wire fence (per net ton to retailers)	$65.00

To Manufacturing Trade

Bright hard wire, Nos. 6 to 9 gage	2.40c.
Spring wire	3.50c.

(Carload lots, f.o.b. Chicago)

Wire nails	$2.35 to $2.45 (keg)
Annealed fence wire	2.50c. to 2.60c. (lb.)
Bright hard wire to manufacturing trade	2.45c.

Anderson, Ind., mill prices are ordinarily $1 a ton over Pittsburgh base; Duluth Minn., mill $2 a ton over Pittsburgh, and Birmingham mill $3 a ton over Pittsburgh.

Cut Nails

	Per 100 Lb.
Carloads, Wheeling, Reading or Northumberland, Pa.	$2.70
Less carloads, Wheeling or Reading	2.80

Light Plates

No. 10, blue annealed, f.o.b. P'gh	2.10c. to 2.20c.
No. 10, blue annealed, f.o.b. Chicago dist.	2.30c.
No. 10, blue annealed, del'd Phila.	2.42c. to 2.52c.
No. 10, blue annealed, B'ham	2.35c.

Sheets

Blue Annealed

	Base per Lb.
No. 13, f.o.b. P'gh	2.25c. to 2.35c.
No. 13, f.o.b. Chicago dist.	2.45c.
No. 13, del'd Philadelphia	2.57c. to 2.67c.
No. 13, blue annealed, B'ham	2.50c.

Continuous Mill Sheets

No. 10 gage, f.o.b. P'gh	2.00c.
No. 13 gage, f.o.b. P'gh	2.15c.

(Usual range 24 in. to 48 in. wide)

Box Annealed, One Pass Cold Rolled

No. 24, f.o.b. Pittsburgh	2.65c. to 2.75c.
No. 24, f.o.b. Chicago dist. mill	2.85c.
No. 24, del'd Philadelphia	2.97c. to 3.07c.
No. 24, f.o.b. Birmingham	3.00c. to 3.10c.

Metal Furniture Sheets

No. 24, f.o.b. P'gh	4.00c.

Galvanized

No. 24, f.o.b. Pittsburgh	3.30c. to 3.40c.
No. 24, f.o.b. Chicago dist. mill	3.50c. to 3.60c.
No. 24, del'd Cleveland	3.49c. to 3.59c.
No. 24, del'd Philadelphia	3.62c. to 3.72c.
No. 24, f.o.b. Birmingham	3.65c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh	2.90c. to 3.00c.
No. 28, f.o.b. Chicago dist. mill	3.00c. to 3.10c.

Automobile Body Sheets

No. 20, f.o.b. Pittsburgh	3.90c.

Long Ternes

No. 24, 8-lb. coating, f.o.b. mill	3.90c. to 4.00c.

Vitreous Enameling Stock

No. 24, f.o.b. Pittsburgh	3.90c.

Tin Plate

	Per Base Box
Standard cokes, f.o.b. P'gh district mills	$5.25
Standard cokes, f.o.b. Gary	5.35

Terne Plate

(*F.o.b. Morgantown or Pittsburgh*)

(Per Package, 20 x 28 in.)

8-lb. coating I.C. $10.70	25-lb. coating I.C. $15.90
15-lb. coating I.C. 13.40	30-lb. coating I.C. 16.80
20-lb. coating I.C. 14.60	40-lb. coating I.C. 18.80

Alloy Steel Bars

(F.o.b. makers' mill)

Alloy Quality Bar Base, 2.65c. per Lb.

S.A.E. Series Numbers		Alloy Differential
2000	(1¼% Nickel)	$0.25
2100	(1½% Nickel)	0.55
2300	(3½% Nickel)	1.50
2500	(5% Nickel)	2.25
3100	Nickel Chromium	0.55
3200	Nickel Chromium	1.35
3300	Nickel Chromium	3.80
3400	Nickel Chromium	3.20
4100	Chromium Molybdenum (0.15 to 0.25 Molybdenum)	0.50
4100	Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600	Nickel Molybdenum (0.20 to 0.30 Molybdenum, 1.25 to 1.75 Nickel)	1.05
5100	Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100	Chromium Steel (0.80 to 1.10 Chromium)	0.45
5100	Chromium Spring Steel	0.20
6100	Chromium Vanadium Bars	1.20
6100	Chromium Vanadium Spring Steel	0.95
9250	Silicon Manganese Spring Steel (flats)	0.25
	Rounds and squares	0.50
	Chromium Nickel Vanadium	1.50
	Carbon Vanadium	0.95

Above prices are for hot rolled steel bars, forging quality. The differential for cold-drawn bars is ¾c. a lb. higher, with standard classification for cold-finished alloy steel bars applying. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis.

Billets under 4 x 4 in. carry the steel bar base. Slabs with a sectional area of 16 in. or over carry the billet price. Slabs with sectional area of less than 16 in. or less than 2½ in. thick, regardless of sectional area, take the bar price.

Rails

	Per Gross Ton
Standard, f.o.b. mill	$43.00
Light (from billets), f.o.b. mill	36.00
Light (from rail steel), f.o.b. mill	34.00
Light (from billets), f.o.b. Ch'go mill	36.00

Track Equipment

	Base per 100 Lb.
Spikes, ⅝ in. and larger	$2.80
Spikes, ½ in. and smaller	2.80
Spikes, boat and barge	3.00
Tie plate, steel	2.07½
Angle bars	$2.75
Track bolts, to steam railroads	$3.80 to 4.00
Track bolts, to jobbers, all sizes, per 100 count	70 per cent off list

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

Butt Weld

Steel Inches	Black	Galv.	Iron Inches	Black	Galv.
⅛	45	19½	¼ and ⅜	+11	+36
¼ to ⅜	51	25½	½	23	5
½	56	42½	¾	28	11
¾	60	48½	1 and 1¼	31	15
1 to 3	62	50½	1½ and 2	35	18

Lap Weld

2	55	43½	2	23	9
2½ to 6	59	47½	2½ to 3½	28	13
7 and 8	56	43½	4 to 6	30	17
9 and 10	54	42½	7 and 8	29	16
11 and 12	53	40½	9 to 12	26	11

Butt Weld, extra strong, plain ends

⅛	41	24½	2 to 3	61	50½
¼ to ⅜	47	30½	¼ and ⅜	+13	+48
½	53	42½	½	23	7
¾	58	47½	¾	28	12
1 to 1¼	60	49½	1 to 2	34	18

Lap Weld, extra strong, plain ends

2	53	42½	½	29	13
2½ to 4	57	46½	2½ to 4	34	20
4½ to 6	56	45½	4½ to 6	33	19
7 to 8	52	39½	7 and 8	31	17
9 and 10	45	32½	9 to 12	21	8
11 and 12	44	31½			

On carloads the above discounts on steel pipe are increased on black by one point, with supplementary discount of 5%, and on galvanized by 1½ points, with supplementary discount of 5%. On iron pipe, both black and galvanized, the above discounts are increased to jobbers by one point with supplementary discounts of 5 and 2½%.

Note.—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Steel		Charcoal Iron	
2 in. and 2¼ in.	38	1¼ in.	1
2½ in.—2¾ in.	46	1¾ in.	8
3 in.	52	2 in.—2¼ in.	13
3¼ in.—3¾ in.	54	2½ in.—2¾ in.	16
4 in.	57	3 in.	17
4½ in. to 6 in.	46	3¼ in. to 3½ in.	18
		4 in.	20
		4½ in.	21

On lots of a carload or more, the above base discounts are subject to a preferential of two fives on steel and of 10 per cent on charcoal iron tubes. Smaller quantities are subject to the following modifications from the base discounts:

Lap Welded Steel—Under 10,000 lb., 6 points under base and one five; 10,000 lb. to carload, 4 points under base and two fives. Charcoal Iron—Under 10,000 lb., 2 points under base; 10,000 lb. to carload, base and one five.

Standard Commercial Seamless Boiler Tubes

Cold Drawn

1 in.	61	3 in.	46
1¼ to 1½ in.	53	3¼ to 3½ in.	48
1¾ in.	37	4 in.	51
2 to 2¼ in.	32	4½, 5 and 6 in.	40
2½ to 2¾ in.	40		

Hot Rolled

2 and 2¼ in.	38	3¼ to 3½ in.	54
2½ and 2¾ in.	46	4 in.	57
3 in.	52	4½, 5 and 6 in.	46

Beyond the above base discounts a preferential discount of 5 per cent is allowed on carload lots. On less than carloads to 10,000 lb., base discounts are reduced 4 points with 5 per cent preferential; on less than 10,000 lb., base discounts are reduced 6 points, with no preferential. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gage take the mechanical tube list and discounts. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

	Per Cent Off List
Carbon, 0.10% to 0.30%, base (carloads)	55
Carbon, 0.30% to 0.40% base	50

Plus differentials for lengths over 18 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.

two months. Manufacturers' wire is quotably unchanged at 2.40c., Pittsburgh, and spring wire at 3.50c. Although these figures are occasionally subject to pressure, most buyers are covered at these levels, which represent no change from the general selling prices during the last two months of the past year. The merchant wire trade continues very dull, although specifications from manufacturers are somewhat better and warrant a fairly good operating rate for that department of the wire industry.

Sheets.—Specifications of one important maker were heavier last week than in any similar period since early last August. This is particularly significant in view of the fact that the automobile industry is not now taking more than 20 per cent of the steel which it uses at time of peak operation, and the improvement in tonnage releases is nearly all attributable to the farm implement makers, railroad car builders and various producers of building materials, which are now beginning to increase their production in anticipation of an active spring demand. Culvert makers are also becoming more active and, excepting the automobile industry, radio producers constitute about the only important sheet consuming industry which is not reasonably busy. In the face of better demand, operations continue to improve and schedules this week call for at least 65 per cent of capacity, with full-finishing mills at a somewhat better rate. Black sheets are now quotable at 2.65c. to 2.75c., Pittsburgh, with general price shading confined largely to the East and to the Detroit market. Material selling on a black sheet basis in Detroit nearly all takes large differentials for special finishings, and in that market it has long been customary to shade the base price rather than the differentials, if lower quotations had to be made. On galvanized material, 3.30c., the price which had been made only to large jobbers, has become more general. Light plates and blue annealed sheets are unchanged at 2.10c. to 2.20c. for the No. 10 gage and 2.25c. to 2.35c. for the No. 13, with wide strip selling at prices $2 a ton under the lower figures. Automobile body and metal furniture sheets are holding at 3.90c. and 4c., Pittsburgh, respectively.

Tin Plate.—Gradual seasonal gains in tin plate specifications are resulting in improved mill operations. Better schedules in independent mills this week have brought the average for the industry to about 75 per cent of theoretical capacity. The leading interest is running its mills at about 83 per cent. Orders for the first half of the year are about equal to the corresponding period of 1929 and tin plate producers do not look for any decline in business, unless crop conditions are impaired. The decline in the official quotation announced last week has achieved the desired result of clearing up price uncertainties.

Strip Steel.—Makers of strip steel are now recognizing prices $2 a ton under official quotations on both hot and cold-rolled strip when any sizable tonnages are involved, although the 1.90c. and 2c., Pittsburgh, and 2.75c., Pittsburgh or Cleveland, quotations on the hot and cold-rolled material respectively still apply on carload lots or less. Demand has shown no marked improvement, although specifications are increasing slightly and operations are higher. Hot mills now average from 50 to 60 per cent of capacity and cold-rolling units 25 to 30 per cent. The automobile industry is limiting its shipments to small lots as a general rule, although one or two makers are taking steel in good volume. Hardware makers are not busy, although other users of strip steel are running at a fair rate.

Coal and Coke.—Despite curtailment in oven operations in the Connellsville district, a considerable surplus of furnace coke is still reaching the market and prices have gained no strength. This grade is quoted at $2.60 to $2.65, Connellsville. Shipments of foundry coke have improved slightly since the first of the year, but are still very poor. Heating coke is also in light demand, and the coal market is adversely influenced by the unseasonably warm weather. Improved steel operations in this district have aided the industrial coal business slightly.

Old Material.—Following a sharp rise in scrap prices last week, the market has grown less active and, in the opinion of some dealers, a weaker undertone prevails. The heavy melting steel in the Pennsylvania Railroad list last week brought in the neighborhood of $17.40, delivered to a Pittsburgh district mill, the price paid having been fully in line with the general market levels. Recently reported sales by dealers to consumers have been at $17, or slightly better, and it is generally conceded that No. 1 railroad steel should bring a premium of about 50c. a ton. However, recent sales to mills have been largely for early shipments, and the tonnages involved have been small enough to enable dealers to cover rather quickly. As a result, some of them have reduced the prices they will pay to cover old orders for both No. 1 and No. 2 steel, and the pressure to buy up material, which has characterized the market for the last two weeks, has now largely subsided. At any rate, it seems that mills which have not already bought scrap will not be in the market before February, and, in the meantime, quotations can hardly be expected to add to their recent strength. No. 1 heavy melting steel is quotable this week at the same level as last. Hydraulic compressed sheets are also unchanged, although the market seems to be somewhat stronger than that for steel. Machine shop turnings have advanced on recent sales to $12 to $12.50, while special material to be shipped from Detroit is said to have brought a higher figure. Scrap rails are also stronger, the Pennsylvania Railroad tonnage having brought close to $17.

Warehouse Prices, f.o.b. Pittsburgh

	Base per Lb.
Plates	3.00c.
Structural shapes	3.00c.
Soft steel bars and small shapes	2.90c.
Reinforcing steel bars	2.75c.
Cold-finished and screw stock—	
Rounds and hexagons	3.60c.
Squares and flats	4.10c.
Bands	3.25c.
Hoops	4.25c.
Black sheets (No. 24), 25 or more bundles	3.70c. to 3.80c.
Galv. sheets (No. 24), 25 or more bundles	4.35c. to 4.45c.
Light plates, blue annealed (No. 10), 1 to 24 plates	3.25c. to 3.35c.
Blue annealed sheets (No. 13), 1 to 24 sheets	3.40c. to 3.50c.
Galv. corrug. sheets (No. 28), per square	$4.33
Spikes, large	3.40c.
Small	3.80c. to 5.25c.
Boat	3.80c.
Track bolts, all sizes, per 100 count,	60 per cent off list
Machine bolts, 100 count,	60 per cent off list
Carriage bolts, 100 count,	60 per cent off list
Nuts, all styles, 100 count,	60 per cent off list
Large rivets, base per 100 lb.	$3.50
Wire, black soft ann'l'd, base per 100 lb.	$2.90 to 3.00
Wire, galv. soft, base per 100 lb.	2.90 to 3.00
Common wire nails, per keg	2.80 to 2.90
Cement coated nails, per keg	2.95 to 3.05

Prices per gross ton delivered consumers' yards in Pittsburgh and points taking the Pittsburgh district freight rate:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel	$16.50 to $17.00
No. 2 heavy melting steel	15.00 to 15.50
Scrap rails	16.00 to 17.00
Compressed sheet steel	16.50 to 17.00
Bundled sheets, sides and ends	15.00 to 15.50
Cast iron carwheels	14.00 to 14.50
Sheet bar crops, ordinary	18.00 to 18.50
Heavy breakable cast	12.00 to 12.50
No. 2 railroad wrought	16.50 to 17.00
Hvy. steel axle turnings	14.00 to 14.50
Machine shop turnings	12.00 to 12.50
Acid Open-Hearth Grades:	
Railr. knuckles and couplers	20.00 to 20.50
Railr. coil and leaf springs	20.00 to 20.50
Rolled steel wheels	20.00 to 20.50
Low phos. billet and bloom ends	21.00 to 22.00
Low phos., mill plates	20.50 to 21.00
Low phos., light grades	19.50 to 20.50
Low phos., sheet bar crops	20.50 to 21.00
Heavy steel axle turnings	14.00 to 14.50
Electric Furnace Grades:	
Low phos., punchings	18.50 to 19.00
Hvy. steel axle turnings	14.00 to 14.50
Blast Furnace Grades:	
Short shoveling steel turnings	11.00 to 11.50
Short mixed borings and turnings	11.00 to 11.50
Cast iron borings	11.00 to 11.50
Rolling Mill Grades:	
Steel car axles	19.50 to 20.50
Cupola Grades:	
No. 1 cast	14.00 to 15.00
Rails 3 ft. and under	17.50 to 18.50

Gear Company Celebrates Fortieth Anniversary

The W. A. Jones Foundry & Machine Co., Chicago, manufacturer of gears, speed reducers, flexible couplings, pulleys and other equipment, is this year celebrating its fortieth anniversary. The company has had few changes in executive personnel. The present officers are: W. G. Jones, president; J. A. Sizer, secretary and treasurer; G. W. Page, vice-president in charge of purchasing; W. F. Coleman, vice-president in charge of manufacturing; F. H. Hoge, vice-president in charge of engineering.

Semi-Finished Steel, Raw Materials, Bolts and Rivets

Mill Prices of Semi-Finished Steel

Billets and Blooms

	Per Gross Ton
Rerolling, 4-in. and under 10-in., Pittsburgh	$34.00
Rerolling, 4-in. and under 10-in., Youngstown	34.00
Rerolling, 4-in. and under 10-in., Cleveland	34.00
Rerolling, 4-in. and under 10-in., Chicago	35.00
Forging quality, Pittsburgh	39.00

Sheet Bars

(Open Hearth or Bessemer)

	Per Gross Ton
Pittsburgh	$34.00
Youngstown	34.00
Cleveland	34.00

Slabs

(8 in. x 2 in. and under 10 in. x 10 in.)

	Per Gross Ton
Pittsburgh	$34.00
Youngstown	34.00
Cleveland	34.00

Skelp

(F.o.b. Pittsburgh or Youngstown)

	Per Lb.
Grooved	1.85c. to 1.90c.
Universal	1.85c. to 1.90c.
Sheared	1.85c. to 1.90c.

Wire Rods

(Common soft, base)

	Per Gross Ton
Pittsburgh	$40.00
Cleveland	40.00
Chicago	41.00

Prices of Raw Material

Ores

Lake Superior Ores, Delivered Lower Lake Ports

	Per Gross Ton
Old range Bessemer, 51.50% iron	$4.80
Old range non-Bessemer, 51.50% iron	4.65
Mesabi Bessemer, 51.50% iron	4.65
Mesabi non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40

Foreign Ore, c.i.f. Philadelphia or Baltimore

	Per Unit
Iron ore, low phos., copper free, 55 to 58% iron in dry Spanish or Algerian	12.00c.
Iron ore, low phos., Swedish, average 68% iron	12.00c.
Iron ore, basic Swedish, average 65% iron	10.00c.
Manganese ore, washed, 52% manganese, from the Caucasus	30.00c.
Manganese ore, Brazilian, African or Indian, basic 50%	30.00c.
Tungsten ore, high grade, per unit, in 60% concentrates	$15.25 to $16.50

	Per Gross Ton
Chrome ore, 45 to 50% Cr_2O_3, crude, c.i.f. Atlantic seaboard	$22.00 to $24.00

	Per Lb.
Molybdenum ore, 85% concentrates of MoS_2, delivered	50c. to 55c.

Coke

	Per Net Ton
Furnace, f.o.b. Connellsville prompt	$2.60 to $2.65
Foundry, f.o.b. Connellsville prompt	3.50 to 4.75
Foundry, by-product, Ch'go ovens	8.00
Foundry, by-product, New England, del'd	11.00
Foundry, by-product, Newark or Jersey City, delivered	9.00 to 9.40
Foundry, by-product, Phila.	9.00
Foundry, Birmingham	5.00
Foundry, by-product, St. Louis, f.o.b. ovens	8.00
Foundry by-prod., del'd St. Louis	9.00

Coal

	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	$1.25 to $1.75
Mine run coking coal, f.o.b. W. Pa. mines	1.50 to 1.75
Gas coal, ¾-in. f.o.b. Pa. mines	1.90 to 2.00
Mine run gas coal, f.o.b. Pa. mines	1.65 to 1.75
Steam slack, f.o.b. W. Pa. mines	80c. to 90c.
Gas slack, f.o.b. W. Pa. mines	1.00 to 1.10

Ferromanganese

	Per Gross Ton
Domestic, 80%, seaboard	$100.00
Foreign, 80%, Atlantic or Gulf port, duty paid	100.00

Spiegeleisen

	Per Gross Ton Furnace
Domestic, 19 to 21%	$31.00 to $34.00
Domestic, 16 to 19%	29.00 to 32.00

Electric Ferrosilicon

	Per Gross Ton Delivered
50%	$83.50
75%	130.00

	Per Gross Ton Furnace		*Per Gross Ton Furnace*
10%	$35.00	12%	$39.00
11%	37.00	14 to 16%	45.00

Bessemer Ferrosilicon

F.o.b. Jackson County, Ohio, Furnace

	Per Gross Ton		*Per Gross Ton*
10%	$30.00	12%	$34.00
11%	32.00		

Silvery Iron

F.o.b. Jackson County, Ohio, Furnace

	Per Gross Ton		*Per Gross Ton*
6%	$22.00 to $23.00	10%	$26.00 to $28.00
7%	23.00 to 24.00	11%	28.00 to 30.00
8%	24.00 to 25.00	12%	30.00 to 32.00
9%	25.00 to 26.00		

Other Ferroalloys

Ferrotungsten, per lb. contained metal del'd	$1.40 to $1.50
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carloads	11.00c.
Ferrovanadium, per lb. contained vanadium, f.o.b. furnace	$3.15 to $3.65
Ferrocarbontitanium, 15 to 18%, per net ton, f.o.b. furnace, in carloads	$160.00
Ferrophosphorus, electric or blast furnace material, in carloads, 18%, Rockdale, Tenn., base, per gross ton	$91.00
Ferrophosphorus, electric 24%, f.o.b. Anniston, Ala., per gross ton	$122.50

Fluxes and Refractories

Fluorspar

	Per Net Ton
Domestic, 85% and over calcium fluoride, not over 5% silicon, gravel, f.o.b. Illinois and Kentucky mines	$18.00
No. 2 lump, Illinois and Kentucky mines	20.00
Foreign, 85% calcium fluoride, not over 5% silica, c.i.f. Atlantic port, duty paid	$18.25 to 18.75
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silica, f.o.b. Illinois and Kentucky mines	32.50

Fire Clay Brick

	Per 1000 f.o.b. Works High-Heat Duty Brick	Intermediate Heavy Duty Brick
Pennsylvania	$43.00 to $46.00	$35.00 to $38.00
Maryland	43.00 to 46.00	35.00 to 38.00
New Jersey	50.00 to 65.00	.....
Ohio	43.00 to 46.00	35.00 to 38.00
Kentucky	43.00 to 46.00	35.00 to 38.00
Missouri	43.00 to 46.00	35.00 to 38.00
Illinois	43.00 to 46.00	35.00 to 38.00
Ground fire clay, per ton	7.00	

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	$43.00
Chicago	52.00
Birmingham	50.00
Silica clay, per ton	$8.50 to 10.00

Magnesite Brick

	Per Net Ton
Standard sizes, f.o.b. Baltimore and Chester, Pa.	$65.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	40.00
Standard size	45.00

Chrome Brick

	Per Net Ton
Standard size	$45.00

Mill Prices of Bolts, Nuts, Rivets and Set Screws

Bolts and Nuts

Per 100 Pieces

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
†Machine bolts	70
†Carriage bolts	70
Lag bolts	70
Plow bolts, Nos. 1, 2, 3 and 7 heads	70
Hot-pressed nuts, blank or tapped, square	70
Hot-pressed nuts, blank or tapped, hexagons	70
C.p.c. and t. square or hex. nuts, blank or tapped	70
Washers*	7.00c. to 6.75c. per lb. off list

*F.o.b. Chicago, New York and Pittsburgh.

†Bolts with rolled thread up to and including ⅛ in. x 6 in. take 10 per cent lower list prices.

Bolts and Nuts

	Per Cent Off List
Semi-finished hexagon nuts	70
Semi-finished hexagon castellated nuts, S.A.E.	70
Stove bolts in packages, P'gh	75, 20, 10 and 5
Stove bolts in packages, Chicago	75, 20, 10 and 5
Stove bolts in packages, Cleveland	75, 20, 10 and 5
Stove bolts in bulk, P'gh	75, 20, 10, 5 and 2½
Stove bolts in bulk, Chicago	75, 20, 10, 5 and 2½
Stove bolts in bulk, Cleveland	75, 20, 10, 5 and 2½
Tire bolts	60, 5 and 5

Discounts of 70 per cent off on bolts and nuts applied on carload business. For less than carload orders discounts of 55, 60 per cent apply.

Large Rivets

(½-in. and larger)

	Base per 100 Lb.
F.o.b. Pittsburgh or Cleveland	$3.10
F.o.b. Chicago	3.20

Small Rivets

(7/16-in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh	70 and 10
F.o.b. Cleveland	70 and 10
F.o.b. Chicago	70 and 10

Cap and Set Screws

(Freight allowed up to but not exceeding 50c. per 100 lb. on lots of 200 lb. or more)

	Per Cent Off List
Milled cap screws	80, 10 and 5
Milled standard set screws, case hardened,	80 and 5
Milled headless set screws, cut thread	75 and 10
Upset hex. head cap screws, U.S.S. thread	85
Upset hex. cap screws, S.A.E. thread	85
Upset set screws	80, 10 and 5
Milled studs	70

Chicago

Ingot Output Gains as Mill Obligations Increase—A 70 Per Cent Rate Expected by Next Week

CHICAGO, Jan. 14.—Ingot output in the Chicago district has gained several points in the week and now stands a trifle above 65 per cent of capacity. Orders now in hand are being fitted to schedules for next week, when producers expect ingot production to reach at least 70 per cent. The leading producer has put in service a banked furnace at the Joliet works and one at the Gary works. Active steel mill furnaces now number 22 of 36 in the district. It is of interest that releases are more than keeping pace with production and live obligations on steel mill books are now larger than a year ago.

Sellers believe that a congestion of specifications may take place near the end of the month. A year ago specifications were coming to mills more rapidly than they could be conveniently scheduled, and at that time mill obligations were not so heavy as they are now.

Demand for steel is well diversified as to product and as to classification of consumers. There is ample evidence that a large part of current releases are not only for rounding out stocks, but also to build them larger, which is taken by the trade as a reflection that consumers feel greater assurance as to business in the immediate future.

Prices for finished steel are less clearly defined. Local producers still regard 2c. a lb. as the market price for plates, shapes and bars. However, plates from outside mills are coming to Chicago at 1.95c., and freight differentials no longer closely define the limits of competing territories, especially to the south and east. Wire products have been marked down $2 a ton.

Prices for pig iron at Milwaukee and in Iowa lost ground in the week because of an offering for quick sale of 15,000 to 20,000 tons.

Ferroalloys.—Shipments of these commodities are in moderate volume and new sales are individually small and for quick delivery.

Sheets.—New buying and releases are heavier and hot mill output has reached 60 per cent of capacity both at Chicago and Milwaukee. Container manufacturers are taking larger quantities of sheets and shipments of roofing material are steadily mounting to the south and southwest. Jobbers are feeling the impulse of more active business and their releases to mills are measurably larger.

Base prices per lb., deliv'd from mill in Chicago: No. 24 black sheets, 2.90c.; No. 24 galv., 3.55c. to 3.65c.; No. 10 blue ann'l'd, 2.35c. Deliv'd prices at other Western points are equal to the freight from Gary, plus the mill prices, which are 5c. per 100 lb. lower than Chicago delivered prices.

Pig Iron.—A disturbance, which seems to have spent itself in the week, temporarily lowered pig iron prices at Milwaukee and in Iowa by at least $1 a ton. This situation came about through an offering for quick sale and movement of 15,000 to 20,000 tons of pig iron reported to have been made by a steel mill blast furnace. Places where these sales were made have temporarily become dead spots both as to prices and as to movement of new tonnages of Northern iron produced by merchant stacks. However, Chicago producers are holding to $20 a ton, f.o.b. local furnaces, and sizable sales have been made at this level throughout the week. New buying of Northern iron is running 50 per cent above the weekly average in December, and shipments are fully 25 per cent heavier. A sale of 1000 tons of Southern iron has been made at $13 a ton, Birmingham, or $19.01, delivered Chicago.

Prices per gross ton at Chicago:

N'th'n No. 2 fdy., sil. 1.75 to 2.25	$20.00
N'th'n No. 1 fdy., sil. 2.25 to 2.75	20.50
Malleable, not over 2.25 sil	20.00
High phosphorus	20.00
Lake Super. charcoal, sil. 1.50	27.04
S'th'n No. 2 fdy. (all rail)	$19.01 to 19.51
Low phos., sil. 1 to 2, copper free	29.50
Silvery, sil. 8 per cent	$28.79 to 29.79
Bess. ferrosilicon, 14-15 per cent	46.29

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnace, not including an average switching charge of 61c. per gross ton.

Bolts, Nuts and Rivets.—Jobbers and manufacturers alike are ordering larger quantities of these commodities. This movement has now been under way for 10 days, or possibly more, and sellers believe it to be a clear indication of improvement in business rather than a short run of orders held back during the inventory period.

Plates.—Orders for plates are about equal to the volume a week ago. Car shops continue to draw heavily against commitments for car contracts at hand and shipments of plates for pipe manufacture are still of fair size. It is estimated here that not less than 31,000 cars are on inquiry, including 11,500 on which the Chesapeake & Ohio is taking figures. The Louisville & Nashville is expected to come into the market soon. Interest in steel in oil producing sections of the country is increasing. An order for 1000 tons of plates is specified for delivery to the Southwest and an inquiry from the same direction brings 3500 tons of new business before the local trade. Prices for plates lack strength at 2c. a lb., Chicago.

Structural Material.—Formal contract has been placed with the American Bridge Co. for the Wabash Avenue bridge, Chicago, which calls for 2800 tons of steel, including the machinery. The territory surrounding Chicago continues to give a good account in the matter of structural awards and inquiries. Two contracts in western Michigan call for 1200 tons, and fresh inquiries in Kansas, Missouri and Oklahoma total more than 5000 tons of steel. In the local market there is promise that a number of sizable projects will come up for bids in the early part of the year. Competition for going business is keen. Prices for fabricated steel are weak.

Mill prices on plain material, per lb.: 2.00c. base, Chicago.

Cast Iron Pipe.—An encouraging feature of this market is the interest shown by public utility companies. A number of inquiries from this source are in the market for amounts that range from 500 tons to 2000 tons each. Several water companies have placed large orders. The situation leads sellers to feel that business of this kind will be normal over the next three or four weeks. Contractors in and around Chicago are finding business dull, this being a condition which usually prevails at this time of the year. Bismarck, Mo., has awarded a general contract for laying 25,000 ft. of 4-in., 10,000 ft. of 6-in. and 2000 ft. of 8-in. pipe. Racine, Wis., is taking bids this week on 700 tons of 6 to 16-in. pipe. Wauwatosa, a suburb of Milwaukee, will close bids Jan. 17 on 4000 ft. of 6-in., 2000 ft. of 8-in., 9000 ft. of 12-in. and 2000 ft. of 16-in. in 16 or 18-ft. lengths; also 700 tons of pipe in 12-ft. lengths and 120 tons of Class D fittings.

Prices per net ton, deliv'd Chicago: Water pipe, 6-in. and over, $42.20; 4-in., $46.20; Class A and gas pipe, $3 extra.

Bars.—Western bar mill operations are slowly expanding. Some of the increase in business is traceable to the automobile industry. It is noticeable that the demand for this commodity is slowly growing among many users in diversified industries. Tractor manufacturers are holding to schedules that are close to plant capacities, and they report no slackening in new orders and therefore no cuts in order books. Orders for road building machinery are more numerous and manufacturers of this kind of equipment foresee an active demand. Variations in prices for mild steel bars are no more numerous than a week ago. This market is quotable at 2c. a lb. Deliv-

Warehouse Prices, f.o.b. Chicago

	Base per Lb.
Plates and structural shapes	3.10c.
Soft steel bars	3.00c.
Reinforc'g bars, billet steel	1.95c. to 2.45c.
Under 5 tons	2.85c.
5 ton to 30 tons	2.45c.
30 tons and over	2.00c.
Reinforc'g bars, rail steel	1.80c.
Cold-fin. steel bars and shafting—	
Rounds and hexagons	3.60c.
Flats and squares	4.10c.
Bands (¾ in. in Nos. 10 and 12 gages)	3.20c.
Hoops (No. 14 gage and lighter)	3.75c.
Black sheets (No. 24)	4.05c.
Galv. sheets (No. 24)	4.90c.
Blue ann'l'd sheets (No. 10)	3.35c.
Spikes, ⅜ in. and larger	3.55c.
Track bolts	4.55c.
Rivets, structural	4.00c.
Rivets, boiler	4.10c.

	Per Cent Off List
Machine bolts	60
Carriage bolts	60
Coach or lag screws	60
Hot-pressed nuts, sq., tap, or blank	60
Hot-pressed nuts, hex., tap, or blank	60
No. 8 black ann'l'd wire, per 100 lb.	$3.45
Com. wire nails, base per keg	$2.85 to 2.95
Cement c't'd nails, base per keg	2.85 to 2.95

eries are prompt on most sizes. The movement of alloy steel bars is heavier, but, with output at 30 per cent of capacity, there is much room for improvement. Specifications this week are 30 per cent higher than the average for December. Both shipments and specifications of iron bars have registered some improvement since a week ago. Consumers of rail steel bars are taking larger quantities and are urging prompt delivery. Specifications from manufacturers of barn equipment are larger, and the bed industry is finding greater use of rail steel bars. Prices are steady at 1.90c., Chicago Heights. The lull in orders during the past month has allowed producers to round out stocks of rail steel reinforcing bars and fence post material.

Wire Products.—Prices for wire and wire products, with the exception of bright and spring wire and woven wire fencing, have been reduced to $2.35, base, per keg to the jobbing trade and to $2.45 to retailers in carload lots. The base price for manufacturers' wire remains at 2.40c. a lb., Pittsburgh, and 2.45c., Chicago. Announcement of the new prices comes after several weeks in which quotations had shown variation in highly competitive territories. It is too early to gage whether the new levels will act as a stimulant to the market, which already had shown some improvement over its condition at the end of the year. New orders are well distributed over the country. The aggregate tonnage in the first two weeks of January is not as heavy as a year ago, but the fact that the demand curve is pointing upward is encouraging to producers. Any pick-up which may have taken place in the automobile industry is scarcely reflected in orders for wire and wire products. Jobbers, on the other hand, are giving evidence of a desire to round out and even expand stocks through more frequent and, in some cases, larger orders. Wire mills are producing at 50 per cent of capacity.

Cold-Rolled Strip.—A greater number of small orders from a wider variety of users is being taken by the local trade as assurance that an upturn in demand is at hand. The aggregate of current orders, however, is making little impression on output, which is estimated at 30 per cent of capacity for the industry as a whole.

Old Material.—Dealers continue to view this market as gaining strength, but, gaged by consumer interest, there is little improvement except in cast iron borings. Old contracts with consumers for borings were taken at $9.75 to $10 a gross ton, delivered. Against this business dealers have been willing to pay a shade above $10 a ton. This week a producer of malleable borings is reported to have sold 1000 tons at $10.75 a gross ton, delivered. Shipments of this grade are heavier as industry speeds production. Quotations on heavy melting steel are nominal at $12.75 to $13.25 a gross ton, delivered. The last price paid by a melter was $13, but brokers have been bidding up available tonnages so a common price on trades is $13.25, or possibly a shade higher. Heavier use of scrap is forecast by the increased volume of new business being taken by steel mills. Sellers point to this situation and the curtailed rate of shipment of scrap, due to cold weather, as factors which will make for a stronger market. Railroad offerings this week include 6000 tons by the Rock Island, 4000 tons by the Wabash and 1000 tons by the Pere Marquette. A motor car manufacturer will sell 15 cars of borings.

Prices deliv'd Chicago district consumers:

Per Gross Ton	
Basic Open-Hearth Grades:	
Heavy melting steel	$12.75 to $13.25
Shoveling steel	12.75 to 13.25
Frogs, switches and guards, cut apart, and misc. rails	13.50 to 14.00
Hydraul. compressed sheets	11.00 to 11.50
Drop forge flashings	9.75 to 10.25
No. 1 busheling	11.00 to 11.50
Forg'd cast and r'l'd steel carwheels	17.50 to 18.00
Railroad tires, charg. box size	17.50 to 18.00
Railroad leaf springs cut apart	17.50 to 18.00
Acid Open-Hearth Grades:	
Steel couplers and knuckles	16.00 to 16.50
Coil springs	18.00 to 18.50
Electric Furnace Grades:	
Axle turnings	12.75 to 13.25
Low phos. punchings	15.00 to 15.50
Low phos. plates, 12 in. and under	15.00 to 15.50
Blast Furnace Grades:	
Axle turnings	10.50 to 11.00
Cast iron borings	9.50 to 10.00
Short shoveling turnings	9.25 to 9.75
Machine shop turnings	7.50 to 8.00
Rolling Mill Grades:	
Iron rails	14.50 to 15.00
Rerolling rails	14.50 to 15.00
Cupola Grades:	
Steel rails less than 3 ft.	16.50 to 17.50
Steel rails less than 2 ft.	18.50 to 19.00
Angle bars, steel	15.25 to 15.75
Cast iron carwheels	13.75 to 14.25
Malleable Grades:	
Railroad	16.25 to 16.75
Agricultural	14.50 to 15.00
Miscellaneous:	
*Relaying rails, 56 to 60 lb.	23.00 to 25.00
*Relaying rails, 65 lb. and heav.	26.00 to 31.00
Per Net Ton	
Rolling Mill Grades:	
Iron angle and splice bars	15.00 to 15.50
Iron arch bars and transoms	17.00 to 17.50
Iron car axles	25.50 to 26.00
Steel car axles	15.75 to 16.25
No. 1 railroad wrought	12.00 to 12.50
No. 2 railroad wrought	11.50 to 12.00
No. 1 busheling	9.00 to 9.50
No. 2 busheling	7.00 to 7.50
Locomotive tires, smooth	15.50 to 16.00
Pipes and flues	9.50 to 10.00
Cupola Grades:	
No. 1 machinery cast	13.50 to 14.00
No. 1 railroad cast	12.75 to 13.25
No. 1 agricultural cast	12.00 to 12.50
Stove plate	10.50 to 11.00
Grate bars	10.75 to 11.25
Brake shoes	10.50 to 11.00

*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

Rails and Track Supplies.—Releases of standard-section rails are measurably heavier than current rollings, and mills are arranging to increase output above the present rate of 85 per cent of capacity. The same situation exists in track supply departments, where orders are piling up and larger production is near at hand. New orders for rails total 15,000 tons, of which 8000 tons was placed by the Soo Line with Illinois Steel Co., Inland Steel Co. and Bethlehem Steel Co. The remaining 7000 tons was composed of three lots ordered by small Western railroads. Several buyers have placed a total of 14,000 tons of track supplies, and fresh inquiries from various sources aggregate 15,000 tons. Transactions in the light rail market are confined to scattered orders of carlot proportions.

Prices f.o.b. mill, per gross ton: Standard section open-hearth and Bess. rails, $43; light rails, rolled from billets, $36. *Per lb.:* Standard railroad spikes, 2.80c.; track bolts with square nuts, 3.80c.; steel tie plates, 2.07½c. to 2.15c.; angle bars, 2.75c.

Reinforcing Bars.—Fresh inquiry in this market is less active. Another spell of severe weather is seriously handicapping contractors, with the result that shipments from bending shops are small. Bar benders' backlogs are light, and operations do not average above 20 per cent of capacity. Prices for reinforcing bars show little change since a week ago. Published quotations for billet steel reinforcing bars in lots of 30 tons or less have made little impression on the market for the reason that competition for heavier tonnages, on which shops actually build backlogs, is unusually severe. A contract has been placed in Chicago for 450 tons for a Y. M. C. A. building. A structure at Wabash Avenue and Harrison Street, Chicago, will require about 1000 tons if it is of reinforced concrete design.

Coke.—There has been little change in this market in the past week. Shipments are holding at a steady rate and all ovens are lighted.

Expects Sheet Orders to Show Large Spring Gain

Stating that the average operating rate of the full-finished sheet steel industry is now between 60 and 70 per cent, H. E. Sheldon, president, Allegheny Steel Co., Brackenridge, Pa., says that this company is running at a slightly better rate than the average. Commenting on prospects, Mr. Sheldon said, "We do not expect the first quarter of 1930 to equal our best quarters in 1929, but commencing with the spring there is every reason to expect that our business will show a substantial upswing, and I am generally optimistic regarding the remainder of the year. Bookings since the first of the year have been very encouraging."

Steel Corporation Offers Employees Stock at $169

The United States Steel Corporation has made another stock offering to employees, this one consisting of 100,000 shares of common to be sold at $169 a share. The offering a year ago was at $165 a share. The official announcement made by Myron C. Taylor, chairman of the finance committee, was as follows:

"In accordance with the stock subscription plan heretofore adopted, the finance committee has decided to offer to employees of the United States Steel Corporation and its subsidiaries the privilege of subscribing for 100,000 shares of the common stock of the corporation at a price of $169."

New York

Steel Price Irregularities Continue as Orders Expand Moderately—Pig Iron Sales 10,000 Tons

NEW YORK, Jan. 14.—One large sale of pig iron, 5000 tons for first half, swelled the total for the week to more than 10,000 tons. The General Electric Co. has closed for its Erie, Pa., and New England plants and for at least part of its requirements at Bayway, N. J. The market, however, is by no means active. Scattered inquiries for small lots account for a few thousand tons. Caution dominates the policy of buyers, who see no incentive for contracting ahead. Foundry iron is freely available at $17, Buffalo, for No. 2 plain or No. 2X, or at delivered prices that figure back to such a basis. Southern producers continue to be important competitive factors in this district, having booked several thousand tons in the past week. The reduced combination rail-and-ship rates from Birmingham, which went into effect several months ago, will expire March 31, and Northern producers of pig iron have filed a protest with the Interstate Commerce Commission against their renewal. The rail-and-barge rates via Norfolk, Va., are not covered by the protest, since barge charges are subject to negotiation and are not regulated by the Federal commission. Collections are tightening up somewhat, but not seriously. Shipments are said to be holding up satisfactorily. The Heppenstall Forge Co., Bridgeport, Conn., is inquiring for 1000 tons of Swedish charcoal iron.

Prices per gross ton, delivered New York district:

Buffalo No. 2 fdy., sil. 1.75 to 2.25	$21.91
*Buff. No. 2, del'd east. N. J.	20.28
East. Pa. No. 2 fdy., sil. 1.75 to 2.25	$19.89 to 21.02
East. Pa. No. 2X fdy., sil. 2.25 to 2.75	20.39 to 21.52

Freight rates: $4.91 from Buffalo, $1.39 to $2.52 from eastern Pennsylvania.

*Prices delivered to New Jersey cities having rate of $3.28 a ton from Buffalo.

Finished Steel.—Moderate gains in orders for steel have been accompanied by price irregularities, which are perhaps more pronounced than those mentioned a week ago. Marked weakness has developed on plates and shapes. A public opening last week by the Department of Plant and Structures, New York, in which the only important item was about 450 tons of plates for bridge repair work brought the low quotation from Eggleston Brothers, jobbers, of 2.0565c., delivered on the job in New York, and this price included trucking to the bridge and is subject to a discount of 2 per cent. The only mill which bid on the plates was the Alan Wood Steel Co., whose delivered price was 2.16c. a lb. Other bids ranged from 2.10c. to 2.24c. Although most of the small-lot plate business is being taken at 1.95c. to 2c., Coatesville, Pa., or 2.12½c. to 2.17½c., New York, the more desirable orders have brought out prices of 2.07½c., New York. Price irregularity continues on structural shapes, but the usual market range is 2.04½c. to 2.14½c., New York. A considerable number of steel bar orders have been taken at 1.85c., Pittsburgh, but within the past few days the bar mills have adopted a firmer price attitude, and current quotations are said to be steady at 1.90c., Pittsburgh. Weakness persists in sheets. Black sheets have been quite freely sold at 2.65c., Pittsburgh, although some mills are holding for 2.70c. and 2.75c. Concessions from 3.40c., Pittsburgh, on galvanized sheets are being given to the larger jobbers. The $2 a ton reduction on all wire products except wire rods, manufacturers' wire and woven wire fencing brings formal quotations on these products to the levels which have obtained on a considerable portion of the business booked in the past few weeks. Steel orders in the past week were helped out by the placing of the quarterly requirements of the New York Central Railroad, the tonnages being about equal to those ordered in the previous quarter. Structural steel business seems to have entered the usual midwinter lull, but a few fair-sized jobs have been placed, including 4200 tons for a hotel, 2500 tons for an apartment building, 2000 tons for a bank building and 1200 tons for a school building, all in New York. The Structural Steel Board of Trade of New York reports the record-breaking total of 669,208 tons for 1929 booked by members and non-members, but not including civil engineering projects such as subways, tunnels and bridges. The December total, at 104,449 tons, was unusually large, but included 53,000 tons for the Empire State Building, New York. As the 1928 total recorded by the Structural Steel Board of Trade was 458,259 tons, the gain for 1929 was approximately 46 per cent.

Mill prices per lb., deliv'd New York: Soft steel bars, 2.24c.; plates, 2.07½c. to 2.17½c.; structural shapes, 2.04½c. to 2.14½c.

Reinforcing Bars.—The market remains quiet, with no awards of importance. Prices for billet steel bars in 40, 50 and 60-ft. lengths have decreased from 2c. to 1.95c., Pittsburgh. Stock shipments from mills are quoted at 2.20c., Pittsburgh, and 2.54c., delivered New York.

Cast Iron Pipe.—Prices quoted at recent openings of bids on gas and water pipe have been slightly firmer. Private users are providing much of the present buying activity, but municipalities are preparing inquiries for substantial tonnages. New York City is expected to inquire for several thousand tons of pipe in February. Albany, N. Y., opened bids last week on 10,000 tons of 48-in. water pipe, on which the United States Pipe & Foundry Co. was low. The other bidders were the Warren Foundry & Pipe Co., bidding on 5000 tons, and the Herbert Kennedy Co., New York, agent for the French pipe interest. E. L. Phillips & Co., New York, are inquiring for gas pipe for a Long Island utility, and Stone & Webster, Boston, are in the market for about

Warehouse Prices, f.o.b. New York

	Base per Lb.
Plates and structural shapes	3.30c.
Soft steel bars, small shapes	3.25c.
Iron bars	3.24c.
Iron bars, Swed. charcoal	7.00c. to 7.25c.
Cold-fin. shafting and screw stock—	
Rounds and hexagons	3.50c.
Flats and squares	4.00c.
Cold-roll. strip, soft and quarter hard	5.15c. to 5.40c.
Hoops	4.25c.
Bands	3.75c.
Blue ann'l'd sheets (No. 10)	3.25c. to 3.90c.
Long terne sheets (No. 24)	5.80c.
Standard tool steel	12.00c.
Wire, black annealed	4.50c.
Wire, galv. annealed	5.15c.
Tire steel, ½ x ½ in. and larger	3.40c.
Smooth finish, 1 to 2½ x ¼ in. and larger	3.75c.
Open-hearth spring steel, bases	4.50c. to 7.00c.

	Per Cent Off List
Machine bolts, cut threads:	
¾ x 6 in. and smaller	60
1 x 30 in. and smaller	50 to 50 and 10
Carriage bolts, cut thread:	
½ x 6 in. and smaller	60
¾ x 20 in. and smaller	50 to 50 and 10
Coach Screws:	
½ x 6 in. and smaller	60
1 x 6 in. and smaller	50 to 50 and 10

Boiler Tubes—	Per 100 Ft.
Lap welded, 2-in.	$17.33
Seamless steel, 2-in.	20.24
Charcoal iron, 2-in.	25.00
Charcoal iron, 4-in.	67.00

Discounts on Welded Pipe

Standard Steel—	Black	Galv.
⅛-in. butt	46	29
¼-in. butt	51	37
1-3-in. butt	53	39
2½-6-in. lap	48	35
7 and 8-in. lap	44	17
11 and 12-in. lap	37	12
Wrought Iron—		
⅛-in. butt	5	+19
¼-in. butt	11	+ 9
1-1½-in. butt	14	+ 6
2-in. lap	5	+14
3-6-in. lap	11	+ 6
7-12-in. lap	3	+16

Tin Plate (14 x 20 in.)

	Prime	Seconds
Coke, 100 lb. base box	$6.45	$6.20
Charcoal, per Box—	A	AAA
IC	$9.70	$12.10
IX	12.00	14.25
IXX	13.90	16.00

Terne Plate (14 x 20 in.)

IC—20-lb. coating	$10.00 to $11.00
IC—30-lb. coating	12.00 to 13.00
IC—40-lb. coating	13.75 to 14.25

Sheets, Box Annealed—Black, C. R. One Pass

	Per Lb.
Nos. 18 to 20	3.70c.
No. 22	3.85c.
No. 24	3.90c.
No. 26	4.00c.
No. 28*	4.15c.
No. 30	4.40c.

Sheets, Galvanized

	Per Lb.
No. 14	4.15c.
No. 16	4.00c.
No. 18	4.15c.
No. 20	4.25c.
No. 22	4.35c.
No. 24†	4.50c.
No. 26	4.75c.
No. 28*	5.00c.
No. 30	5.40c.

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

†For 50 bundles or more, 25c. per 100 lb. less.

800 tons of gas pipe for New England companies. The American Construction & Securities Co., New York, is reported to have closed on upward of 10,000 tons of gas pipe for delivery over the first half of the year.

Prices per net ton deliv'd New York: Water pipe, 6-in. and larger, $34.60 to $36.60; 4-in. and 5-in., $37.60 to $39.60; 3-in., $44.60 to $46.60. Class A and gas pipe $3 extra.

Warehouse Business.—Demand for material from stock is more active than is usual this early in the year. A fair tonnage of structural shapes is being bought. Black sheets are quiet, but good business is reported in galvanized, and there is some buying of blue annealed sheets. Since warehouses in this district have increased the differentials for gage on blue annealed sheets without revising the base price, it is noteworthy that on one gage galvanized sheets are cheaper than blue annealed. No. 16 gage galvanized are quoted at 4c. a lb. for shipment from stock and No. 16 gage blue annealed sheets, with the base price at 3.90c. and the extra for gage 30c. a 100 lb., are quoted at 4.20c.

Coke.—Furnace coke prices are lacking in strength, with the Connellsville quotation at $2.65 a net ton and distress carloads offered at $2.50. There is a steady movement of foundry coke on contracts, but little buying for prompt shipment. Special brands of beehive foundry coke are $4.85 a net ton, ovens, or $8.56, delivered to northern New Jersey, Jersey City and Newark, and $9.44 to New York and Brooklyn. By-product coke is quoted at $9 to $9.40 a net ton, Newark or Jersey City, and $10.06, New York or Brooklyn.

Old Material.—Prices of all grades are unchanged in a quiet market. A limited tonnage of No. 1 heavy melting steel is being bought for shipment to Bethlehem, Pa., and deliveries are also being made to consumers at Coatesville, Pa., and Claymont, Del. No. 2 heavy melting steel is being bought at $12.50 a ton, delivered, with shipments going forward to mills at Conshohocken, Phoenixville and Pencoyd, Pa.

Dealers' buying prices per gross ton, f.o.b. New York:

No. 1 heavy melting steel	$10.50 to $11.35
Heavy melting steel (yard)	7.50 to 8.00
No. 1 hvy. breakable cast.	9.75 to 10.50
Stove plate (steel works).	8.00
Locomotive grate bars....	8.25
Machine shop turnings....	7.00 to 7.50
Short shoveling turnings..	7.25 to 7.50
Cast borings (blast fur. or steel works).....	7.00 to 7.50
Mixed borings and turnings	6.75 to 7.50
Steel car axles	15.25 to 16.25
Iron car axles	20.50 to 21.00
Iron and steel pipe (1 in. dia., not under 2 ft. long)	9.25 to 9.75
Forge fire	8.50 to 9.00
No. 1 railroad wrought...	11.50 to 12.50
No. 1 yard wrought, long..	10.50 to 11.50
Rails for rolling.....	10.50 to 11.00
Stove plate (foundry)....	8.25 to 8.50
Malleable cast (railroad).	12.50 to 13.00
Cast borings (chemical)..	8.50 to 9.50

Prices per gross ton, deliv'd local foundries:

No. 1 machry. cast.....	$15.00
No. 1 hvy. cast (columns, bldg. materials, etc.), cupola size.....	13.00
No. 2 cast (radiators, cast boilers, etc.)	12.50

Cleveland

Steel Orders Show Further Increase, Chiefly From Automobile Industry—Pig Iron Also Gains

CLEVELAND, Jan. 14.—There was a further increase in the volume of business the past week. The gain was largely in steel bars and sheets and came mostly from the automotive industry. Orders for alloy steel bars from this industry show a sharp increase. Several of the motor car manufacturers, including makers of medium priced as well as low priced cars, issued fairly good releases. The automobile industry is slowly stepping up its production schedules and will make a much better showing in output in February than during the present month.

Steel plant operations by independent companies in Cleveland have increased to about 65 per cent of ingot capacity, as compared with less than 30 per cent a few weeks ago. A leading Ohio producer of alloy steel has increased its plant operations to about the same basis.

Steel prices show irregularity on a number of products. Nails and wire have been reduced, and the recent weakness on steel bar prices has resulted in the establishment of a 1.85c., Cleveland, price. Sheets and strip steel continue weak and recent irregularity on fender stock has led to a $2 a ton reduction.

Iron Ore.—No interest in the 1930 ore market is being shown as yet by consumers, and there is no talk of prices for the season. It is not expected that prices will be named or the market open up before April 1. Dock shipments are light. Shipments from Lake Erie docks during December were 361,296 gross tons, as compared with 759,875 tons during December, 1928. The dock balance Jan. 1 was 6,142,564 tons, as against 5,695,220 tons on the same date a year ago.

Pig Iron.—Consumers are beginning to take more interest in the market, and sales increased somewhat the past week, during which Cleveland interests sold 24,000 tons of foundry and malleable iron. These orders included two lots for delivery through the first half, one of 1000 tons and one of 2000 tons. Several round lots came from automotive foundries in the Michigan territory. Inquiry is somewhat more plentiful; one producer has inquiries for 10,000 tons. A Hamilton, Ohio, foundry is inquiring for 2500 tons and an Indianapolis consumer for 1000 tons of foundry iron. Buffalo furnaces have reduced prices $1 a ton for delivery in that territory, but prices in this district are being maintained at $18.50, Cleveland, for out-of-town shipment, $19, furnace, for local delivery and $19.50 to $20, furnace, for Michigan delivery. Some buyers are holding off with the expectation of getting lower prices. The Buffalo reductions to $18.50 for No. 2 foundry, and $19 for malleable were made for delivery in the Buffalo territory and are stated to have been brought about by competition of Southern foundry iron in the East and the spread between Buffalo territory and New England prices. New prices have not been announced on Buffalo iron for New England shipment, where Southern foundry iron is more of a competitive factor than in the Buffalo territory. Southern foundry iron is quoted at $13.50, Birmingham. A consumer in this territory is inquiring for 2000 tons of basic iron, but has not been offered a concession from $18.50. Shipping orders show quite a gain over last month. The increase is coming largely from automobile foundries in the Michigan territory, where three of the largest automotive foundries are increasing operations. The Ford Motor Co. has placed some good orders for castings with malleable foundries.

Prices per gross ton at Cleveland:

N'th'n fdy., sil. 1.75 to 2.25	$19.50
S'th'n fdy., sil. 1.75 to 2.25	$19.51 to 20.51
Malleable	19.50
Ohio silvery, 8 per cent...	28.00
Basic Valley furnace.....	18.50
Stand. low phos., Valley...	26.50 to 27.00

Prices except on basic and low phosphorus are delivered Cleveland. Freight rates: 50c. from local furnaces; $3 from Jackson, Ohio; $6.01 from Birmingham.

Semi-Finished Steel.—Specifications for sheet bars show some further increase and billets are also moving better than recently. Prices are holding at $34, Cleveland and Youngstown, for sheet bars, billets and slabs. Although a $2 a ton reduction on wire rods might be expected to follow the reduction on wire products, an effort is being made to maintain the $40 price, in view of the fact that manufacturers' wire has not been reduced.

Bars, Plates and Shapes.—Specifications for steel bars came out in good volume during the week, largely for automotive work. Structural shapes are in fair demand, but there is not much activity in plates. The

Warehouse Prices, f.o.b. Cleveland

	Base per Lb.
Plates and struc. shapes.....	3.00c.
Soft steel bars.....	3.00c.
Reinforc. steel bars.....2.25c. to	2.50c.
Cold-fin. rounds and hex.....	3.65c.
Cold-fin. flats and sq.....	4.15c.
Hoops and bands, No. 12 to ¼ in., inclusive	3.25c.
Hoops and bands, No. 13 and lighter	3.65c.
Cold-finished strip.....	*5.95c.
Black sheets (No. 24).....	3.75c.
Galvanized sheets (No. 24).....	4.50c.
Blue ann'l'd sheets (No. 10).....	3.25c.
No. 9 ann'l'd wire, per 100 lb.....	$2.55
No. 9 galv. wire, per 100 lb.....	2.90
Com. wire nails, base per keg.....	2.55

*Net base, including boxing and cutting to length.

Van Sweringen interests have asked mills to quote direct on plates and on steel axles and other mill specialties for the 11,500 cars and 130 locomotives to be purchased by the Chesapeake & Ohio, Pere Marquette and Hocking Valley railroads. Little new work is coming out in the building field. Considerable inquiry is coming from western New York for small lots of structural steel for highway bridge work. Steel bars have settled down to a flat 1.85c. price, either delivered Cleveland or f.o.b. Cleveland for outside shipment. Contracts taken at 1.90c. are being revised.

Strip Steel.—While orders for hot-rolled strip have improved with some of the mills, the demand is still light and there has not been much increase in mill operations. Price weakness announced last week is still in evidence. Quotations of 1.80c., Pittsburgh, for wide strip and 1.90c. for narrow are being made for attractive orders. Cold-rolled strip continues very quiet. A 2.65c., Cleveland or Pittsburgh, price is commonly quoted for tube stock and the same concession is being made to other good lot buyers. For small lots, 2.75c. still prevails. Fender stock has been reduced $2 a ton to 4.15c., Cleveland or Pittsburgh.

Sheets. — Orders continue to improve, largely from the automotive industry, which during the week issued fairly good releases for automobile body sheets. Other consuming industries do not show much pick-up, although quite a few orders are coming from consumers whose inventories are very low. Auto body sheets are firm at the reduced 3.90c. price, but other grades are weak. On black sheets, 2.65c., Pittsburgh, has become quite common. Jobbing mills quote No. 13 blue annealed sheets at 2.25c. to 2.35c. and No. 10 light plates at 2.10c. to 2.20c., but continuous mills are going $2 a ton lower than the above minimums. The 3.40c. price on galvanized sheets is being shaded $1 to $2 a ton.

Wire Products.—Leading manufacturers have reduced nails and other wire products, except manufacturers' wire, $2 a ton. Nails are now quoted at $2.30 per 100-lb. keg, Cleveland, to jobbers and at $2.40 to dealers. Annealed fence wire is now 2.45c. a lb. to jobbers. Bright hard manufacturers' wire, which is not sold to the jobbing trade, is unchanged at 2.40c. Shading to the now openly quoted prices has been rather common. Contracts taken at the old prices are being revised. Specifications to replenish depleted stocks show an increase.

Reinforcing Bars. — Rochester, N. Y., has asked for bids for a concrete highway bridge that is expected to require 1000 tons of reinforcing steel. The market locally is inactive.

Warehouse Business. — Reflecting the weakness in the sheet market, jobbers have reduced prices $2 to $5 a ton on galvanized sheets and have also revised quotations downward on black sheets. A quantity differential of $3 a ton for less than 10 bundles, which has prevailed for some time on these grades, has been eliminated. Warehouse business is fair and prices on other products unchanged.

Bolts, Nuts and Rivets.—There has been only a slight gain in the demand for bolts and nuts this month. The industry is operating at close to 60 per cent of capacity. Although there are some irregularities, prices appear to be holding fairly well. Rivets are in light demand, but makers look for better business soon from car and locomotive manufacturers.

Coke. — Foundry coke is moving slightly better than recently, and prices are holding to $4.75 to $4.85 for better grades of Connellsville coke and at $8.25, ovens, for Ohio by-product coke. Demand for domestic by-product coke is very slow because of continued mild weather and prices are weak. Egg coke is being freely offered at $4.50, Ohio ovens, a decline of 25c. a ton.

Old Material.—With increase in open-hearth operations, some of the mills are taking more scrap and there is increased activity among dealers who are buying material to fill old orders. This has resulted in a firmer market and price advances on grades that are active. With production materially reduced, especially by the automotive industry, and yard dealers unwilling to sell their stocks at the prices that have been prevailing, dealers are finding it necessary to pay higher prices for material to ship against contracts taken at prices considerably below those now in effect. A local mill purchased a small tonnage of selected No. 1 heavy melting scrap at $15, this being the only business reported placed by a consumer. Dealers are paying as high as $10.50 for blast furnace scrap, an advance of 50c. a ton and $10.25 for machine shop turnings. A local mill is offering the same price for machine shop turnings.

Prices per gross ton delivered consumers' yards:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel	$13.50 to $14.00
No. 2 heavy melting steel	13.00 to 13.50
Compressed sheet steel	12.50 to 13.00
Light bundled sheet stampings	11.50 to 12.00
Drop forge flashings	11.50 to 12.00
Machine shop turnings	9.75 to 10.25
Short shoveling turnings	10.50 to 11.00
No. 1 railroad wrought	13.00 to 13.50
No. 2 railroad wrought	14.00 to 14.50
No. 1 busheling	12.00 to 12.50
Pipes and flues	9.00 to 9.50
Steel axle turnings	12.50 to 13.00
Acid Open-Hearth Grades:	
Low phos., forging crops	17.75 to 18.00
Low phos., billet, bloom and slab crops	18.50 to 18.75
Low phos., sheet bar crops	18.00 to 18.50
Low phos., plate scrap	18.00 to 18.50
Blast Furnace Grades:	
Cast iron borings	10.00 to 10.50
Mixed borings and short turnings	10.00 to 10.50
No. 2 busheling	10.00 to 10.50
Cupola Grades:	
No. 1 cast	15.25 to 15.75
Railroad grate bars	11.00 to 12.00
Stove plate	12.00 to 12.50
Rails under 3 ft.	18.50 to 19.50
Miscellaneous:	
Railroad malleable	18.00 to 18.50
Rails for rolling	16.25 to 16.50

Philadelphia

Steel Prices Lower as Mills Seek Tonnage—Moderate Gains in Buying as Consumers Become More Active

PHILADELPHIA, Jan. 14.—Steel prices now being quoted reflect the pressure which consumers have brought to bear in recent weeks on mills that are in need of tonnage. Weakness extends to plates, bars, black and galvanized sheets and wire products, the latter having been formally reduced $2 a ton, excepting manufacturers' wire.

Consumers of steel are becoming more active. Automotive body builders are increasing output, radio manufacturers are operating at better rates than usual at this season, local forging shops are engaged on releases from automobile companies, and tank and boiler shops are quoting on a substantial tonnage of new business.

Mill operating rates are somewhat better. The Bethlehem Steel Co. is running this week at 70 per cent. Other Eastern mills range from 50 to 60 per cent.

Pig Iron.—Foundry iron consumers continue to limit their orders to carload lots to cover immediate requirements, and sellers are beginning to doubt that there will be much more contracting for the current quarter. On most small orders $20.50 a ton, furnace, applies, but on the more desirable tonnages buyers still claim to be able to obtain concessions of 50c. a ton. The Standard Steel Works Co., Burnham, Pa., has closed on about 3000 tons of low phosphorus iron with an eastern Pennsylvania furnace. Basic iron is quiet, and, with mills maintaining restricted operations, fresh buying of basic is not expected during the present month, although a Coatesville, Pa., consumer has been testing the market without issuing a formal inquiry.

Prices per gross ton at Philadelphia:

East. Pa. No. 2, 1.75 to 2.25 sil.	$20.76 to $21.76
East. Pa. No. 2, 2.25 to 2.75 sil.	21.26 to 22.26
East. Pa. No. 1X	21.72 to 22.76
Basic (del'd east. Pa.)	19.50 to 19.75
Malleable	21.25 to 21.75
Stand. low phos. (f.o.b. east Pa. furnace)	24.00
Cop. b'r'g low phos. (f.o.b. furnace)	23.00 to 24.00
Va. No. 2 plain, 1.75 to 2.25 sil.	22.29
Va. No. 2X, 2.25 to 2.75 sil.	22.79

Prices, except as specified otherwise, are deliv'd Philadelphia. Freight rates: 76c. to $1.64 from eastern Pennsylvania furnaces; $4.54 from Virginia furnaces.

Bars. — Most of the present buying is at 1.90c. a lb., Pittsburgh, or 2.22c., delivered Philadelphia. On the

larger lots, which are occasionally inquired for, the usual quotation is 1.85c., Pittsburgh, or 2.17c., delivered Philadelphia.

Reinforcing Bars.—A substantial tonnage of new business is in the market, but buyers are slow to make awards. The Baltimore General Postoffice will require 560 tons of bars, and about 1000 tons will be used in the Ohio River Boulevard and bridge near Millvale, Pa., bids on which are to be opened Jan. 28. Prices continue at 1.95c., Pittsburgh, or 2.27c., delivered Philadelphia, for billet steel bars, usually with no extra for cutting to length. Rail steel bars are quoted at 1.80c. to 1.95c., Franklin, Pa., and Tonawanda, N. Y., or 2.12c. to 2.27c., delivered Philadelphia, with no extra for cutting to length or bending.

Shapes.—Mills are in need of tonnage for immediate rolling, and desirable specifications have been taken at 1.80c., f.o.b. mills. The present market is quotable at 1.80c. to 1.90c., f.o.b. nearest mill to consumer, or 1.86c. to 1.96c., delivered Philadelphia. Fabricated steel tonnage pending in this district is smaller than in some months, but fabricators have a moderate tonnage on which they are engaged.

Plates.—Operating rates of mills are lower than in some months, but tank and boiler shops are becoming increasingly active and are bidding on some sizable business. Other consumers are operating on a better scale, and some large plate contracts are still to be awarded by shipyards, which are booked with business for some months. Meanwhile, mills are in need of immediate rollings to maintain operations and plates are quoted at 1.90c. to 2c. a lb., Coatesville, Pa., or 2c. to 2.10c., delivered Philadelphia, with concessions of $1 to $2 a ton to large shipbuilders.

Sheets.—Automobile builders are increasing operations as they receive additional releases on contracts with large motor car interests, and radio manufacturers are maintaining good production schedules despite the season. The largest radio manufacturer in the district is producing about 3200 sets a day, which is on a par with its output last fall. Black sheets are quoted at 2.65c., Pittsburgh, or 2.97c. delivered Philadelphia, with 2.60c., Pittsburgh, or 2.92c., Philadelphia, quoted to large preferred buyers. Galvanized sheets are 3.30c. to 3.40c., Pittsburgh. Blue annealed sheets, No. 13 gage, range from 2.25c. to 2.35c., Pittsburgh, or 2.57c. to 2.67c., delivered Philadelphia, with concessions of $1 to $2 a ton from the minimum price granted to preferred buyers. Blue annealed plates, No. 10 gage, range from 2.10c. to 2.20c., Pittsburgh, or 2.42c. to 2.52c., delivered Philadelphia.

Warehouse Business.—Buying from stock continues in fair volume and jobbers are maintaining prices with but slight tendency to shade. Recently some confusion has developed in roofing material by the fact that mills have adopted the plan of quoting roofing by the square foot while most jobbers still sell it per 100 lb.

Imports.—In the week ended Jan. 11, ore imports consisted of 4000 tons of chrome ore from Portuguese Africa and 448 tons from Greece, and 600 tons of manganese ore from Java. Pig iron arrivals totaled 533 tons, of which 498 tons was from British India and 35 tons from Sweden and a total of 1500 tons of ferromanganese was received from the United Kingdom. Steel imports were 25 tons of steel billets, seven tons of bars and seven tons of bearing tubing from Sweden, 77 tons of structural shapes and 50 tons of steel bars from Belgium, five tons of structural shapes from France, and four tons of steel scrap from Germany.

Old Material.—All grades of iron and steel scrap are unchanged in a quiet market. A small tonnage of No. 1 heavy melting steel is being bought for a Bethlehem, Pa., consumer, and shipments of this grade are also being made to mills at Coatesville, Pa., and Claymont, Del. No. 2 heavy melting steel is moving to users at Conshohocken, Phoenixville and Pencoyd, Pa. No transactions of importance are reported on other grades of scrap.

Prices per gross ton delivered consumers' yards, Philadelphia district:

No. 1 heavy melting steel.	$14.50
Scrap T rails	14.00
No. 2 heavy melting steel.	$12.00 to 12.50
No. 1 railroad wrought	15.00 to 15.50
Bundled sheets (for steel works)	11.50
Hydraulic compressed, new	13.00
Hydraulic compressed, old.	12.00 to 12.50
Machine shop turnings (for steel works)	11.00
Heavy axle turnings (or equiv.)	12.50 to 13.00
Cast borings (for steel works and roll. mill)	11.00
Heavy breakable cast (for steel works)	13.50 to 14.00
Railroad grate bars	11.00 to 11.50
Stove plate (for steel works)	11.00 to 11.50
No. 1 low phos., hvy., 0.04% and under	20.50 to 21.50
Couplers and knuckles	19.00 to 19.50
Rolled steel wheels	19.00 to 19.50
No. 1 blast f'nace scrap	10.50 to 11.00
Wrot. iron and soft steel pipes and tubes (new specific.)	14.00
Shafting	19.00
Steel axles	20.00 to 21.00
No. 1 forge fire	13.00 to 13.50
Cast iron carwheels	15.00
No. 1 cast	15.00 to 15.50
Cast borings (for chem. plant)	14.00 to 14.50
Steel rails for rolling	15.00 to 15.50

Warehouse Prices, f.o.b. Philadelphia

	Base per Lb.
Plates, ¼-in. and heavier	2.70c.
Plates, 7/16-in.	2.90c.
Structural shapes	2.70c.
Soft steel bars, small shapes, iron bars (except bands)	2.80c.
Round-edge iron	3.50c.
Round-edge steel, iron finished 1½ x 1½ in.	3.50c.
Round-edge steel planished	4.30c.
Reinforc. steel bars, sq., twisted and deform.	2.60c. to 2.80c.
Cold-fin. steel, rounds and hex.	3.50c.
Cold-fin. steel, sq. and flats	4.00c.
Steel hoops	3.55c.
Steel bands, No. 12 to 7/16-in. inclus.	3.30c.
Spring steel	5.00c.
•Black sheets (No. 24)	3.90c.
†Galvanized sheets (No. 24)	4.65c.
Light plates, blue annealed (No. 10)	3.25c.
Blue ann'l'd sheets (No. 13)	3.40c.
Diam. pat. floor plates—	
¼-in.	5.30c.
5/16-in.	5.50c.
Rails	3.20c.
Swedish iron bars	6.60c.

•For 50 bundles or more; 10 to 49 bun., 4.10c. base; 1 to 9 bun., 4.35c. base.
†For 50 bundles or more; 10 to 49 bun., 4.95c. base; 1 to 9 bun., 5.30c. base.

Detroit Scrap Market Has Strong Undertone

DETROIT, Jan. 14.—There have been no changes in prices during the past week on old material. Current releases are sufficient to cover material coming out, even though it is in much larger tonnage than for several months. The general tone of the market is strong.

Dealers' buying prices per gross ton, f.o.b. cars, Detroit:

Hvy. melting and shov. steel	$12.50 to $13.00
Borings and short turnings	9.25 to 9.75
Long turnings	8.50 to 9.00
No. 1 machinery cast	12.50 to 13.00
Automotive cast	11.50 to 12.00
Hydraul. comp. sheets	12.50 to 13.00
Stove plate	9.00 to 9.50
New No. 1 busheling	11.50 to 12.00
Old No. 1 busheling	9.25
Sheet clippings	8.00 to 8.50
Flashings	10.75 to 11.25

Graduate courses leading to the doctor's degree in metallurgy will be offered by the department of mining and metallurgy at the Carnegie Institute of Technology beginning next fall. The course of study has been outlined by Dr. V. N. Krivobok of the bureau of metallurgical research of the institute and the work will be given by the department of mining and metallurgy of which Prof. James Aston is head.

Large Welded Gantry Crane for Lumber Service

Four 7½-ton, 72-ft. span gantry cranes being completed by the American Crane Co., Friendship, N. Y., for the Waterfront Service Corporation, Brooklyn, N. Y., for handling lumber, are said to be the largest cranes of all-welded construction. Each crane is 113 ft. overall, 56 ft. in height and 46 ft. from top of rail to under side of girder. The floodlight towers on the cranes are 90 ft. in height and of all-welded construction. The current-carrying pole line is 50 ft. in height and 1200 ft. long.

The four cranes are welded throughout, General Electric welding equipment having been used. The structures were welded together in the field, but the units, such as the main bridge, two cantilevers, four legs, two portal girders and frames and the trolley, were factory welded.

The annual sales convention of the Reading Iron Co. was held in Reading, Pa., Jan. 7, 8 and 9. The convention was attended by the district sales representatives of the company, its operating department heads, heads of sales departments, metallurgists and other executives.

Birmingham

Pig Iron Demand Retarded by Light Melt and Carry-Over Stocks—Steel Orders Gain Slightly

BIRMINGHAM, Jan. 14. — The slow improvement in the pig iron market, following the lull at the end of the year, has been disappointing to furnace interests. A light melt and unused balances of fourth quarter contracts have been the chief retarding factors. Many of the larger melters have enough iron due them on fourth quarter contracts to continue present operations to the middle of February, and in some cases into March. Each week has brought an increase in shipments, though the volume is still short of production. One of the largest foundries has increased operations from a four-day week to a five-day week, and output is being gradually stepped up by several cast iron pipe shops. The base price for first quarter iron in the district continues at $15. Fifteen furnaces remain active. Of this number, eight are on foundry iron, six on basic and one on recarburizing iron.

Prices per gross ton, f.o.b. Birmingham dist. furnaces:

No. 2 fdy., 1.75 to 2.25 sil.	$14.50 to $15.00
No. 1 fdy., 2.25 to 2.75 sil.	15.00 to 15.50
Basic	14.50 to 15.00

Finished Steel. — Steel companies report that new business is slightly above the weekly average for December, and backlogs compare favorably with those of 30 days ago. Sheets and wire products are below normal, though the latter has shown improvement since the turn of the year. Demand for fabricated structural steel is fair, with small orders more numerous. The Ingalls Iron Works Co. has booked orders for 560 tons for steam line supports for the Standard Oil Co. at Baton Rouge, La., and 110 tons for a sugar refinery at Gramercy, La. Tank and structural plate fabricators report present demand to be the lightest since November. Nineteen openhearths have been active for the past three weeks.

Cast Iron Pipe.—Additional orders from utility interests and municipalities for 1930 requirements have brightened the pressure pipe market considerably. The volume of new business is better than in several months. Plants in the district shared in another tonnage for Los Angeles, amounting to more than 2700 tons. The United States Pipe & Foundry Co. booked several hundred tons of large diameter pipe for Dallas, Tex. Bids have been opened on a fair-sized project at Cincinnati. Bids for 4500 ft. of 6-in. pipe for Greenville, Ala., were postponed until this week. Two shops have increased operations and others are expected to increase their output within the next few weeks. Stocks have not been built up in advance for the usual spring requirements. Prices remain at $37 to $38 a net ton, Birmingham.

Coke.—Shipping instructions were better last week than for any week since early December. Prices are unchanged at $5 a net ton, Birmingham.

Old Material. — Buying has been resumed by some of the larger consumers of steel scrap. Prices are unchanged.

Prices per gross ton, deliv'd Birmingham dist. consumers' yards:

Heavy melting steel	$13.00 to $13.50
Scrap steel rails	14.00
Short shoveling turnings	9.00
Cast iron borings	9.00
Stove plate	11.50 to 12.00
Steel axles	22.00
Iron axles	23.00
No. 1 railroad wrought	10.00 to 10.50
Rails for rolling	15.50
No. 1 cast	13.00
Tramcar wheels	12.50
Cast iron carwheels	13.00 to 13.50
Cast iron borings, chem.	13.50 to 14.00

Warehouse Prices, f.o.b. Boston

	Base per Lb.
Plates	3.365c.
Structural shapes—	
Angles and beams	3.365c.
Tees	3.365c.
Zees	3.465c.
Soft steel bars, small shapes	3.265c.
Flats, hot-rolled	4.15c.
Reinforcing bars	3.265c. to 3.54c.
Iron bars—	
Refined	3.265c.
Best refined	4.60c.
Norway rounds	6.60c.
Norway squares and flats	7.10c.
Spring steel—	
Open-hearth	5.00c. to 10.00c.
Crucible	12.00c.
Tie steel	4.50c. to 4.75c.
Bands	4.015c. to 5.00c.
Hoop steel	5.50c. to 6.00c.
Cold-rolled steel—	
Rounds and hex	*3.55c. to 5.55c.
Squares and flats	*4.05c. to 7.05c.
Toe calk steel	6.00c.
Rivets, structural or boiler	4.50c.

	Per Cent Off List
Machine bolts	50 and 5
Carriage bolts	50 and 5
Lag screws	50 and 5
Hot-pressed nuts	50 and 5
Cold-punched nuts	50 and 5
Stove bolts	70 and 10

*Including quantity differentials.

Boston

Cast Iron Pipe Prices Advanced $2 to $3 a Ton—Pig Iron Sales About 4000 Tons

BOSTON, Jan. 14.—A Massachusetts machinery maker has bought 1000 tons of No. 2X and No. 1X iron for first quarter; the General Electric Co. bought 150 tons for its Everett and 350 tons for its Pittsfield, Mass. plants. These, with other relatively small tonnages, brought the total for the past week to about 4000 tons. The Sullivan Machinery Co., Claremont, N. H., is asking for prices on 300 tons, and several other consumers have signified they will be in the market shortly. Reports that Buffalo district iron has been offered at less than $17 a ton, base furnace, cannot be substantiated. Furnaces east of Buffalo are meeting that price.

Foundry iron prices per gross ton deliv'd to most New England points:

*Buffalo, sil. 1.75 to 2.25	$21.91 to $22.41
*Buffalo, sil. 2.25 to 2.75	21.91 to 22.41
East. Penn., sil. 1.75 to 2.25	22.65 to 23.15
East. Penn., sil. 2.25 to 2.75	23.15 to 23.65
Va., sil. 1.75 to 2.25	25.21
Va., sil. 2.25 to 2.75	25.71
*Ala., sil. 1.75 to 2.25	24.11
*Ala., sil. 2.25 to 2.75	24.61
†Ala., sil. 1.75 to 2.25	20.25
†Ala., sil. 2.25 to 2.75	20.75

Freight rates: $4.91 all rail from Buffalo; $3.65 all rail from eastern Pennsylvania; $5.21 all rail from Virginia; $9.61 all rail from Alabama and $5.75 rail and water from Alabama to New England seaboard.

*All rail rate.

†Rail and water rate.

Cast Iron Pipe.—Cast iron pipe prices have been advanced $2 to $3 a ton, and a small amount of business has been booked on the new basis. Prices on domestic 4-in. pipe are now $42.10 to $47.10 a ton, f.o.b. common Boston freight rate points; 6 to 16-in., $41.10 to $43.10; and 20-in. and larger, $40.10 to $41.10. A $4 differential is asked on Class A and gas pipe. Boston will open bids at noon, Jan. 27, on 50 tons of 4-in. pipe in 6-ft. lengths; 100 tons of 6-in.; 500 tons of 8 in.; 1400 tons of 12 in.; and 50 tons of 24-in., a total of 2200 tons; also 10 tons of 24 to 48-in. special castings. The city is also in the market for 200 tons of service pipe stock, and 250 tons of branches, curves, etc. A Massachusetts utility company is in the market for 2000 tons of various sizes of gas pipe and probably will close this week.

Fabricated Steel. — Bookings by fabricators the past week were heavier, but new projects involving round tonnages are few. The largest project up for figuring is a local building requiring 4000 tons of steel. The Penn Bridge Co., Beaver Falls, Pa., was low bidder on 195 tons of steel for two bridges at Salem, Warren and Thomaston, Me. One fabricating shop here is booked ahead three months, but others are in need of work and competition for jobs is keen.

Warehouse Business. — Wire nails have been reduced 20c. to $3.10 a keg, base warehouse, making the total reduction on this movement, which started during the third quarter of 1929, 40c. a keg. Plain wire also has been reduced 20c. a 100 lb. The movement of nails and other mill products from warehouses is of comparatively small volume, consumers limiting purchases to actual immediate requirements.

Reinforcing Steel.—Business in billet reinforcing steel bars reported the past week included 300 tons for the Maine Highway Commission, 100 tons for a local electric lighting company office building, and several smaller tonnages, which brought the aggregate up to more than 700 tons. Prices on 1 to 5-ton lots of material are elastic, but on larger quantities are fairly firm. Prices from stock are: One to five-ton lots, 3.16½c., to 3.26½c.

per lb., base, f.o.b. job metropolitan Boston; five to 99 tons, 2.86½c.; 100 tons and larger lots, 2.76½c.

Old Material.—Higher prices for No. 1 heavy melting steel, scrap rails and other kinds of material have curtailed rather than stimulated business. Now that the market shows signs of strengthening, owners of scrap are inclined to hold out for still higher prices. A Worcester, Mass., mill is buying long bundled skeleton, for which dealers are paying around $8.25 a ton, on cars shipping point. For Portland, Me., consumption, dealers are paying $15.50 to $16 a ton for steel axles, but for Pennsylvania consumption from $16.25 to $16.75. Little material is going to Portland. The best offer for stove plate made recently by the Mystic Iron Works is reported as $9 a ton, delivered. Dealers who ship to Pennsylvania are paying $6.50 a ton, on cars shipping point. The Boston & Maine Railroad has closed bids on 77 cars of miscellaneous scrap, including 12 cars of heavy melting steel and eight cars of rails.

Buying prices per gross ton, f.o.b. Boston rate shipping points:

No. 1 heavy melting steel	$10.00 to $10.50
Scrap T rails	10.00 to 10.50
Scrap girder rails	9.00 to 9.50
No. 1 railroad wrought	10.50 to 10.75
No. 1 yard wrought	9.50 to 10.00
Machine shop turnings	6.10 to 6.50
Cast iron borings (steel works and rolling mill)	6.00 to 6.50
Bundled skeleton, long	8.25 to 8.75
Forge flashings	8.50 to 9.00
Blast furnace borings and turnings	6.10 to 6.50
Forge scrap	8.00 to 8.50
Shafting	14.00 to 14.50
Steel car axles	15.50 to 16.50
Wrought pipe 1 in. in diameter (over 2 ft. long)	8.50 to 9.00
Rails for rolling	10.50 to 11.00
Cast iron borings, chemical	9.00 to 9.50
Prices per gross ton deliv'd consumers' yards:	
Textile cast	$14.00 to $14.50
No. 1 machinery cast	15.00 to 15.25
No. 2 machinery cast	14.00 to 14.50
Stove plate	9.00 to 10.00
Railroad malleable	17.00 to 18.00

Cincinnati

Pig Iron Market Quiet, with Sales of About 3000 Tons—Scrap Is Slightly Firmer

CINCINNATI, Jan. 14.—The pig iron market last week lapsed into the quiet position of a few weeks ago. Sales did not exceed 3000 tons. Consumers are still cautious and, although there is an optimistic feeling in the trade, the demand is below normal for this time of the year. Southern furnaces last week sold about 950 tons in this area for spot shipment at prices which figure back to about $14.50, base Birmingham, which is the general quotation here. Two central Ohio buyers took 500 and 100 tons of Northern foundry iron each and an eastern Ohio buyer purchased 500 tons. A Northern furnace representative sold 300 tons of malleable iron to an undisclosed Tennessee consumer. While Northern furnaces are adhering generally to $18.50, base, Lake furnace, on sales in this area, shading of prices on competitive tonnages is tending to give a slight undertone of uncertainty to the price structure, but no definite change has been reported. The Marmon Motor Car Co., Indianapolis, is inquiring for 1000 tons of Northern foundry iron, and a consumer at Bluffton, Ind., is in the market for 150 tons. An inquiry from Hamilton, Ohio, is for 2500 tons.

Prices per gross ton, deliv'd Cincinnati:

So. Ohio fdy., sil. 1.75 to 2.25	$19.89 to $20.39
Ala. fdy., sil. 1.75 to 2.25	17.69 to 18.19
Ala. fdy., sil. 2.25 to 2.75	18.19 to 18.69
Tenn. fdy., sil. 1.75 to 2.25	17.69 to 18.19
S'th'n Ohio silvery, 8 per cent	26.89

Freight rates, $1.89 from Ironton and Jackson, Ohio; $3.69 from Birmingham.

Old Material.—Although the demand for scrap material is not very brisk and shipments on contracts are still slow, the apparent shortage of the better grades of old materials is forcing dealers to offer more attractive prices to obtain enough scrap to apply on contracts. They are bidding 25c. higher on heavy melting steel, No. 2 wrought, machine shop turnings and cast iron borings than a week ago. The Norfolk & Western Railroad list, which closed last Friday, is said to have brought better prices than the December list. The Louisville & Nashville, the Chesapeake & Ohio and the Southern are offering lists, bids on which close this week.

Dealers' buying prices per gross ton, f.o.b. cars, Cincinnati:

Heavy melting steel	$12.25 to $12.75
Scrap rails for melting	13.00 to 13.50
Loose sheet clippings	8.00 to 8.50
Bundled sheets	10.75 to 11.25
Cast iron borings	8.50 to 9.00
Machine shop turnings	8.25 to 8.75
No. 1 busheling	10.00 to 10.50
No. 2 busheling	6.50 to 7.00
Rails for rolling	13.50 to 14.00
No. 1 locomotive tires	14.25 to 14.75
No. 2 railroad wrought	12.25 to 12.75
Short rails	17.50 to 18.00
Cast iron carwheels	12.00 to 12.50
No. 1 machinery cast	18.50 to 19.00
No. 1 railroad cast	15.00 to 15.50
Burnt cast	10.00 to 10.50
Stove plate	10.00 to 10.50
Brake shoes	10.00 to 10.50
Agricultural malleable	14.00 to 14.50
Railroad malleable	15.00 to 15.50

Warehouse Prices, f.o.b. Cincinnati

	Base per Lb.
Plates and struc. shapes	3.40c.
Bars, soft steel or iron	3.30c.
New billet reinforc. bars	3.15c.
Rail steel reinforc. bars	3.00c.
Hoops	4.05c.
Bands	3.50c.
Cold-fin. rounds and hex.	3.85c.
Squares	4.35c.
Black sheets (No. 24)	4.05c.
Galvanized sheets (No. 24)	4.90c.
Blue ann'l'd sheets (No. 10)	3.45c.
Structural rivets	3.85c.
Small rivets	65 per cent off list
No. 9 ann'l'd wire, per 100 lb.	$3.00
Com. wire nails, base per keg	2.85
Cement c't'd nails, base 100 lb. keg	2.85
Chain, per 100 lb.	8.75
	Net per 100 Ft.
Lap-welded steel boiler tubes, 2-in.	$16.50
4-in.	34.50
Seamless steel boiler tubes, 2-in.	17.50
4-in.	36.00

Canada

Pig Iron Demand Shows Some Improvement

TORONTO, ONT., Jan. 14.—Improvement in demand for both spot and future delivery featured business in the Canadian pig iron markets during the week. A number of melters placed orders for iron for delivery to the end of March, and other substantial tonnages are pending for early closing. Indications are that approximately 10,000 tons is to be placed in the immediate future for first quarter shipment. Spot sales for the week totaled approximately 2000 tons, made up of lots ranging from 50 to 300 tons. Prices are holding.

Prices per gross ton:

Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75	$23.60
No. 2 fdy., sil. 1.75 to 2.25	23.10
Malleable	23.60
Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75	$25.00
No. 2 fdy., sil. 1.75 to 2.25	24.50
Malleable	25.00
Basic	23.50
Imported Iron, Montreal Warehouse	
Summerlee	$33.50
Carron	33.00

Old Material.—While some improvement developed in the demand for scrap during the past few days the market as a whole is dull. Mills continue to confine purchases to small tonnage lots. Foundries, however, have been buying more freely.

Dealers' buying prices:

	Per Gross Ton	
	Toronto	Montreal
Heavy melting steel	$10.00	$8.50
Rails, scrap	11.00	9.00
No. 1 wrought	10.00	12.00
Machine shop turnings	7.50	5.00
Boiler plate	7.50	6.00
Heavy axle turnings	8.00	7.50
Cast borings	7.50	5.00
Steel borings	7.50	6.50
Wrought pipe	6.00	6.00
Steel axles	15.00	20.00
Axles, wrought iron	17.00	22.00
No. 1 machinery cast	....	17.00
Stove plate	....	13.00
Standard carwheels	....	16.00
Malleable	....	13.00
Per Net Ton		
No. 1 mach'ry cast	$16.00	....
Stove plate	12.00	....
Standard carwheels	15.00	....
Malleable scrap	14.00	....

Warehouse Prices, f.o.b. St. Louis

	Base per Lb.
Plates and struc. shapes	3.25c.
Bars, soft steel or iron	3.15c.
Cold-fin. rounds, shafting, screw stock	3.75c.
Black sheets (No. 24)	4.25c.
Galv. sheets (No. 24)	5.10c.
Blue ann'l'd sheets (No. 10)	3.45c.
Black corrug. sheets (No. 24)	4.30c.
Galv. corrug. sheets	5.15c.
Structural rivets	4.15c.
Boiler rivets	4.15c.
	Per Cent Off List
Tank rivets, ⅞-in. and smaller, 100 lb. or more	65
Less than 100 lb.	60
Machine bolts	60
Carriage bolts	60
Lag screws	60
Hot-pressed nuts, sq., blank or tapped, 200 lb. or more	60
Less than 200 lb.	50
Hot-pressed nuts, hex., blank or tapped, 200 lb. or more	60
Less than 200 lb.	50

St. Louis

Increased Pig Iron Demand Expected as Foundries Renew Operations—Steel Outlook Better

ST. LOUIS, Jan. 14.—Buying of pig iron continues light, but it is expected that melters will show interest in first quarter requirements this week, when most of the foundries in the district will have resumed operations after having been closed down for the holidays. The St. Louis Gas & Coke Corporation's sales for the week are about 3000 tons, including 1000 tons to an implement manufacturer. A small tonnage of Southern iron was sold. Reports from the South are that the outlook is good for a renewal of municipal projects, involving large tonnages of cast iron pipe, which had been held up on account of the lagging bond market. The pig iron market is firm.

Prices per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25, f.o.b. Granite City, Ill.	$19.50 to $20.00
Malleable, f.o.b. Granite City	20.00
N'th'n No. 2 fdy., deliv'd St. Louis	22.16
Southern No. 2 fdy., deliv'd	18.92 to 19.42
Northern malleable, deliv'd	22.16
Northern basic, deliv'd	22.16

Freight rates: 75c. (average) Granite City to St. Louis; $2.16 from Chicago; $4.42 from Birmingham.

Finished Steel.—Buying of plates, shapes and bars has been light, but there was an improvement both in new business and specifications during the last week. The Granite City Steel Co., which curtailed operations during the holidays, expects to have all operations at full or nearly full capacity within the next week. Prices are firm. There has been no sign of life in the construction industry here, and fabricators continue to complain of poor business.

Old Material.—The market for old material continues quiet. Consumers, who had been asking dealers to withhold shipments against contracts, are taking scrap more freely, but new business is very light. Offerings of country dealers are small, and railroads are shipping very little on account of sleet and snow, but railroad offerings are heavy, including: Chesapeake & Ohio, 10,598 tons; Louisville & Nashville, 7000 tons; Wabash, 3482 tons; Missouri-Kansas-Texas, 1700 tons; Toledo & Western, 1380 tons; Chicago & Alton, 1370 tons; Chicago, Milwaukee, St. Paul & Pacific, 1280 tons; Ann Arbor, 125 tons; Chicago, Rock Island & Pacific, 200 carloads; Great Northern, 40 carloads; Pullman Co. (St. Louis), 28 carloads; Chicago & Eastern Illinois, 16 carloads; Nashville, Chattanooga & St. Louis, 10 carloads.

Dealers' buying prices per gross ton, f.o.b. St. Louis district:

No. 1 heavy melting or shoveling steel	$12.50 to $13.00
No. 2 heavy melting or shoveling steel	11.75 to 12.25
No. 1 locomotive tires	14.50 to 15.00
Misc. stand.-sec. rails including frogs, switches and guards, cut apart	13.50 to 14.00
Railroad springs	15.50 to 16.00
Bundled sheets	9.50 to 10.00
No. 2 railroad wrought	12.50 to 13.00
No. 1 busheling	9.75 to 10.25
Cast iron borings and shoveling turnings	9.25 to 9.75
Iron rails	13.00 to 13.50
Rails for rolling	14.50 to 15.00
Machine shop turnings	6.75 to 7.25
Heavy turnings	9.50 to 10.00
Steel car axles	18.00 to 18.50
Iron car axles	25.50 to 26.00
Wrot. iron bars and trans.	21.50 to 22.00
No. 1 railroad wrought	13.00 to 13.50
Steel rails, less than 3 ft.	17.00 to 17.50
Steel angle bars	14.00 to 14.50
Cast iron carwheels	14.00 to 14.50
No. 1 machinery cast	15.25 to 15.75
Railroad malleable	14.00 to 14.50
No. 1 railroad cast	14.50 to 15.00
Stove plate	11.75 to 12.25
Relay. rails 60 lb. and under	20.50 to 23.50
Relay. rails 70 lb. and over	26.50 to 29.00
Agricult. malleable	14.00 to 14.50

Business in metal furniture sheets is better, and orders for automobile sheets are showing some increase. The Wickwire-Spencer company is operating its open-hearths at 50 per cent of capacity.

Old Material.—The principal transaction of the past week was the sale of 4000 tons of No. 1 heavy melting steel and No. 1 busheling at $14.50 and $13.50 respectively. The mill which bought the scrap has suspended shipments for the time being on old orders as well as on the new order. Some sales of No. 1 machinery cast scrap are reported at $14.50 to $15, and a few sales of knuckles and couplers, coil and leaf springs and rolled steel wheels have been made at $18.50. The Michigan Central list, which recently closed, came to Buffalo at about $14.40 for the No. 1 heavy melting steel.

Prices per gross ton, f.o.b. Buffalo consumers' plants:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel	$14.00 to $14.50
No. 2 heavy melting scrap	12.50
Scrap rails	$13.00 to 14.00
Hydraul. comp. sheets	12.50
Hand bundled sheets	10.50 to 11.00
Drop forge flashings	12.50
No. 1 busheling	12.50 to 13.00
Hvy. steel axle turnings	12.50 to 13.00
Machine shop turnings	8.00 to 8.50
No. 1 railroad wrought	10.50 to 11.00
Acid Open-Hearth Grades:	
Knuckles and couplers	17.00 to 17.50
Coil and leaf springs	17.00 to 17.50
Rolled steel wheels	17.00 to 17.50
Low phos. billet and bloom ends	18.00 to 18.50
Electric Furnace Grades:	
Short shov. steel turnings	12.00 to 12.50
Blast Furnace Grades:	
Short mixed borings and turnings	10.75 to 11.25
Cast iron borings	10.75 to 11.25
No. 2 busheling	8.00
Rolling Mill Grades:	
Steel car axles	16.50 to 17.00
Iron axles	20.00 to 21.00
Cupola Grades:	
No. 1 machinery cast	14.50 to 15.00
Stove plate	12.15
Locomotive grate bars	10.00 to 10.50
Steel rails, 3 ft. and under	17.75 to 18.00
Cast iron carwheels	11.50 to 12.00
Malleable Grades:	
Industrial	16.50 to 17.00
Railroad	16.50 to 17.00
Agricultural	16.50 to 17.00
Special Grades:	
Chemical borings	12.00 to 12.50

Buffalo

Pig Iron Reduced $1 a Ton—Steel Mill Operations Are Slightly Better—Scrap Firmer

BUFFALO, Jan. 14.—Prices on foundry and malleable iron in this district have been reduced $1 a ton, bringing quotations on No. 2 plain, 1.75 to 2.25 silicon, to $18.50. The 2X grade, 2.25 to 2.75 silicon, becomes $19, and No. 1X, 2.75 to 3.25 silicon, is now $20. Malleable is being quoted at $19. A few lots of over 1000 tons each have been booked by local makers, though in the main there has been no great rush to cover at the new prices, in spite of the fact that first quarter requirements have not all been placed. A 4000-ton inquiry from the East will probably be placed this week, and a 1000-ton inquiry for foundry from the central part of the State is still pending. The Eastern price is subject to concessions by local producers, though nothing lower than $17, furnace, has been reported. Iron producers are encouraged by an improved operation in the heating and boiler industries.

Prices per gross ton, f.o.b. furnace:

No. 2 fdy., sil. 1.75 to 2.25	$18.50
No. 2X fdy., sil. 2.25 to 2.75	19.00
No. 1 fdy., sil. 2.75 to 3.25	20.00
Malleable, sil. up to 2.25	19.00
Basic	17.00
Lake Superior charcoal	27.28

Finished Steel.—Operation of open-hearths at the Lackawanna plant of the Bethlehem Steel Co. is the same as in the previous week, at 19 of 24; the Donner Steel Co. is operating three open-hearths and may increase to four this week. The Seneca Iron & Steel Company is operating at about 60 per cent, a slight gain.

Snyder Mining Co., Oliver Building, Pittsburgh, has been organized to take over the Mesabi iron ore properties of the Shenango Furnace Co. and will be owned jointly by the Shenango company and the Crucible Steel Co. of America. The Crucible company acquired a substantial interest in these properties last year, thus assuring itself an uninterrupted source of iron ore over a long period.

Warehouse Prices, f.o.b. Buffalo

	Base per Lb.
Plates and struc. shapes	3.40c.
Soft steel bars	3.30c.
Reinforcing bars	2.95c.
Cold-fin. flats, sq. and hex	4.45c.
Rounds	3.95c.
Cold-rolled strip steel	5.85c.
Black sheets (No. 24)	4.20c.
Galv. sheets (No. 24)	4.85c.
Blue ann'l'd sheets (No. 10)	3.50c.
Com. wire nails, base per keg	$3.60
Black wire, base per 100 lb	3.75

Pacific Coast

Structural Steel and Cast Iron Pipe Gain

SAN FRANCISCO, Jan. 14.—Improvement is noted in the demand for structural steel and cast iron pipe. Some fair-sized lots were placed during the week. The price structure is generally quite well maintained.

In reinforcing bars, the only two projects in excess of 100 tons were 120 tons for a school at Redlands, Cal., awarded to the Soule Steel Co., and 250 tons for the James Monroe school, Seattle, which went to an unnamed interest.

The Western Pipe & Steel Co. secured 5200 tons for a welded steel pipe line at San Diego, Cal. Bids have been opened on 280 tons of riveted steel pipe for Omak, Wash.

The McClintic-Marshall Co. was awarded 2900 tons of structural steel for a factory for the Procter & Gamble Co. at Long Beach, Cal., and the Consolidated Steel Corporation got 350 tons for a newspaper building in the same city. The Moore Dry Dock Co. booked 175 tons for a warehouse in Oakland.

The city of Los Angeles has placed 290 tons of 8-in. Class 150 cast iron pipe with the American Cast Iron Pipe Co., 181 tons with the United States Pipe & Foundry Co., and 690 tons of 6 and 8-in. with both the National and Pacific States companies. The Griffiths Co. has been awarded 736 tons of 4 to 12-in. for Lido Island, Newport Beach, Cal. Knapp & Goss took 140 tons of 4 to 8-in. for West Salem, Ore. Bids will be opened Jan. 18 on 3600 tons of 4 to 16-in. Class B and Class 150 pipe for the East Bay Municipal District, Oakland, and on Jan. 23 on 1900 tons for Alhambra, Cal.

The United States Steel Products Co. will furnish 200 tons of black sheets for 1931 license plates for the State of Washington.

The Pure Iron Culvert & Mfg. Co., Portland, Ore., was awarded 250 tons of corrugated pipe by the Alaskan Road Commission.

Pig iron prices remain unchanged as quoted below.

Prices per gross ton at San Francisco:

*Utah basic	$25.00 to $26.00
*Utah fdy., sil. 2.75 to 3.25	25.00 to 26.00
**Indian fdy., sil. 2.75 to 3.25	25.00 to 26.00

*Delivered San Francisco.
**Duty paid, f.o.b. cars San Francisco.

Warehouse Prices, f.o.b. San Francisco

	Base per Lb.
Plates and struc. shapes	3.30c.
Soft steel bars	3.30c.
Small angles, ⅞-in. and over	3.15c.
Small angles, under ⅞-in.	3.55c.
Small channels and tees, ¾-in. to 2¾-in.	3.75c.
Spring steel, ¼-in. and thicker	5.00c.
Black sheets (No. 24)	4.90c.
Blue ann'l'd sheets (No. 10)	3.90c.
Galv. sheets (No. 24)	5.30c.
Struc. rivets, ½-in. and larger	5.65c.
Com. wire nails, base per keg	$3.40
Cement c't'd nails, 100 lb. keg	3.40

Canadian Mineral Production Makes New Record

For the fourth successive year the mining industry of Canada in 1929 reached a new high record output, when production amounted to $303,876,000, or 10.5 per cent more than in 1928, according to the Dominion Bureau of Statistics, Ottawa. New records were established in output of asbestos, cement, clay products, copper, gold, gypsum, lime, nickel, petroleum, salt, stone, sand and gravel, zinc, and in the value of natural gas. The total increase in value of mineral output was $28,887,000.

Metals as a group showed the greatest gain, at a total of $151,327,000, compared with $132,012,454 in 1928. This increase was 14.63 per cent. Fuels at $76,116,000, compared with $74,413,160 in the preceding year gained 3 per cent. Other nonmetallics had a value of $21,205,000, against $18,826,692 in the preceding year, a gain of 12.6 per cent. Structural materials, including brick, tile, cement, lime, stone, sand and gravel, were valued at $55,228,000, compared with $49,737,181 in 1928, a gain of 11 per cent.

Output of Particular Metals

Copper production, at 242,401,609 lb. worth $43,362,000, showed an advance of 19.5 per cent in quantity and 51.6 per cent in value; production in 1928 amounted to 202,696,046 lb. valued at $28,598,249. British Columbia yielded nearly 103,000,000 lb.; Ontario, about 84,000,000 lb., and Quebec, 55,000,000 lb.

Despite the great amount of development work being done in the Sudbury area, production of nickel at 109,200,000 lb. worth $25,700,000, showed gains of 12.8 per cent in quantity and 15.2 per cent in value over the 96,755,578 lb. in 1928 valued at $22,318,907.

Lead production at 327,062,151 lb. valued at $16,551,000 showed a decline of 3.3 per cent in quantity, but a gain of 6.4 per cent in value, in comparison with the 337,946,688 lb. worth $15,553,231 in 1928.

Zinc production at 204,621,300 lb. valued at $11,009,000 was 10.8 per cent higher in quantity and 10 per cent greater in value than in the preceding year. As in the case of lead, most of Canada's zinc is derived from British Columbia, but Quebec and Ontario also produce appreciable quantities. Production in 1928 was 184,647,374 lb. valued at $10,143,050.

Maintaining the Name "Sheffield"

The three-hundredth annual inauguration of the Master Cutler at Sheffield reminds the British journal *Engineer* of the direct influence the "Cutlers' Company" has upon British steel making. The Cutlers' Company is not a mere company of cutlers, but an association of the makers of steel and of steel products throughout the areas of Sheffield and Rotherham for progressive and defensive purposes. It operates under its own charter granted by Act of Parliament in 1624, and its great asset, apart from the powerful backing by the large steel makers and strong financial resources in the shape of trust funds, known as the Sheffield Defence Fund, is the legal possession of the word Sheffield as applied to iron and steel. That mark has been and is the registered property, in all countries, of the Cutlers' Company, and it is its business to see that that word is never improperly used in England or abroad.

To prevent pirating of international trade-marks is the most difficult task, and has given the Cutlers' Company plenty of work to do in the last few decades. "Another phase in the activities of the Cutlers' Company," continues *Engineer*, "is to prevent, by prosecution or injunction, irresponsible Sheffield firms from marking their goods, say, 'Best Sheffield Cutlery' or 'Best Sheffield Tools' when the quality does not warrant that description. It has the right to enter and search the works and houses of all makers of tools and cutlery who are alleged to be selling goods of bad quality. If such goods are found the company may even confiscate or destroy them. Thus the makers who are within the jurisdiction of the Cutlers' Company carry on their work under what is really a disciplinary board composed of themselves and brought into being by the foresight of their ancestors over three hundred years ago."

Aetna-Standard Engineering Co., Youngstown, manufacturer of rolling mill machinery, has declared an extra dividend of 50c. per share on its common stock in addition to the usual quarterly payment of 25c., and the regular quarterly disbursement of $1.75 on preferred. The company is operating its two plants, at Warren, Ohio, and Ellwood City, Pa., on day and night shifts, and is completing one of its most successful years.

Appleton Steel Tube Co., Appleton, Wis., is in the hands of a receiver, H. W. Tuttrup, president, Citizens National Bank, Fond du Lac, Wis., having been appointed on Dec. 26, by order of the circuit court of Outagamie County in the form of a decree by consent following formal admission by directors of the company that it has been unable to meet obligations.

Fabricated Structural Steel

Week's Awards About 27,000 Tons, With Close to 20,000 Tons Added to Pending Projects

STRUCTURAL steel awards, though affected by a seasonal lull, were about 27,000 tons in the past week, as against 7000 tons in the week before. Outstanding contracts were 4200 tons for a hotel in New York, 3100 tons for a telephone building at Dayton, Ohio, 2500 tons for an apartment building in New York and 2150 tons for a power plant in Boston. Formal contract for the erection of 53,000 tons of structural steel for the Empire State Building, New York, was placed with Post & McCord, the American Bridge Co. to do the fabricating, as recently reported. Except for a bridge at McKees Rocks, Pa., requiring 13,000 tons, not much new tonnage was added to pending projects, the total for the week, including this job, not exceeding 20,000 tons. Awards follow:

STATE OF MAINE, 200 tons, highway bridges, to Penn Bridge Co.

BOSTON, 2150 tons, Edison Electric Illuminating Co.; power station, 1100 tons, to Lehigh Structural Steel Co.; office building, 1050 tons, to American Bridge Co.

BOSTON, 275 tons additional, South Station canopies, to New England Structural Co.

BOSTON, 100 tons, meat packing house alterations, to New England Structural Co.

NEEDHAM, MASS., 100 tons, high school, to an unnamed fabricator.

NEW YORK, 53,000 tons, Empire State Building; erection awarded to Post & McCord; fabrication to American Bridge Co., as reported in Dec. 26 issue of THE IRON AGE.

NEW YORK, 4200 tons, hotel on West Forty-seventh Street, to George A. Just Co.

NEW YORK, 2500 tons, apartment building at Second Avenue and Sixty-eighth Street, to A. E. Norton, Inc.

NEW YORK, 2000 tons, Central Hanover Bank Building, Sixth Avenue, to Hedden Iron Construction Co.

NEW YORK, 1200 tons, addition to Hunter College, to Taylor-Fichter Steel Construction Co.

STATE OF NEW JERSEY, 250 tons, highway bridges, to McClintic-Marshall Co.

SAN DOMINGO, 300 tons, sugar warehouse, to Virginia Bridge & Iron Co.

NORFOLK, VA., 375 tons plates, 40 catamarans for United States Engineers, Norfolk, to Pittsburgh-Des Moines Steel Co.

PITTSBURGH, 1500 tons, 10 barges for Keystone Sand & Supply Co., to Dravo Contracting Co.

PITTSBURGH, 150 tons, gates for lock No. 8, Allegheny River, United States Engineer, to Independent Bridge Co.

GRAND HAVEN, MICH., 700 tons, structure for sand and gravel handling plant, to Rochester Bridge Co.

ROGERS CITY, MICH., 560 tons, power plant for Michigan Lime Stone & Chemical Co., to American Bridge Co.

DAYTON, OHIO, 3100 tons, Ohio Bell Telephone Co., to American Bridge Co.

CHICAGO, 130 tons, building for United Autographic Register Co., to Gage Structural Steel Co.

CHICAGO, 2800 tons, Wabash Avenue bridge, to American Bridge Co.; previously reported to an unnamed bidder.

HOT SPRINGS, ARK., 150 tons, bridge girders, to Virginia Bridge & Iron Co.

STATE OF PENNSYLVANIA, 190 tons, highway bridge in Columbia County, to Anthracite Bridge Co.

PENNSYLVANIA RAILROAD, 200 tons, bridge, to Fort Pitt Bridge Co.

CANTON, OHIO, 320 tons, building for Ohio Public Service Co., to Hiner Structural Steel Co.

SAN DIEGO, CAL., 250 tons, plates for pipe line, to Western Pipe & Steel Foundry.

LONG BEACH, CAL., 2900 tons, factory for Procter & Gamble Co., to McClintic-Marshall Co.

LONG BEACH, 350 tons, newspaper company building, to Consolidated Steel Corporation.

OAKLAND, CAL., 175 tons, warehouse, to Moore Dry Dock Co.

Structural Projects Pending

Inquiries for fabricated steel work include the following:

NEW YORK, 500 tons, Polyclinic Hospital, West Fiftieth Street.

NEW YORK, 250 tons, physics laboratory at Fordham University.

NEW YORK, 900 tons, public school No. 155, South Ozone Park, Queens.

NEW ROCHELLE, N. Y., unnamed tonnage, Roosevelt High School; Tooker & Marsh, architects.

STATE OF PENNSYLVANIA, 200 tons, highway bridges.

BALTIMORE, 635 tons, yard runway for Western Electric Co.

STATE OF VIRGINIA, 400 tons, highway bridges.

MCKEES ROCKS, PA., 13,000 tons, bridge over Ohio River; bids Jan. 28.

CHICAGO, 500 tons, two elementary schools.

KANSAS CITY, MO., 1500 tons, toll building for Southwestern Bell Telephone Co.

KANSAS CITY, MO., 600 tons, building for Dirks Lumber Co.

TOPEKA, KAN., 500 tons, high school.

WAKITA, OKLA., 400 tons, power house.

STATE OF OKLAHOMA, 2100 tons, two bridges across Red River, revived.

STATE OF PENNSYLVANIA, 115 tons, Ohio River Boulevard in Allegheny County; bids open Jan. 28.

OMAK, WASH., 282 tons, plates for pipe line; bids opened.

Railroad Equipment

Southern Pacific Orders 400 Cars —Inquiry for 750

ASIDE from orders from the Southern Pacific for 400 freight cars and an inquiry from the Milwaukee road for 750 stock cars, the week's budget of railroad equipment business relates chiefly to small lots. Greater activity is expected late this month or early in February. Details of the week's business follow:

Southern Pacific has ordered 300 automobile-furniture cars from Pressed Steel Car Co. and 100 steel gondola cars from Ralston Steel Car Co.

Milwaukee road is inquiring for 750 stock cars.

Louisville & Nashville is expected to inquire within a week or so for 1800 freight cars.

Seaboard Air Line has ordered eight locomotives from Baldwin Locomotive Works. It recently inquired for 15. This road may buy as many as 2000 box cars, although its recent inquiry called for only 1000.

Denver & Rio Grande Western has ordered 10 Mallet type locomotives from American Locomotive Co.

Burlington will build 100 flat cars in its own shops. This road is inquiring for 10 baggage cars.

Erie is inquiring for 10 gas-electric rail motor cars.

Canadian National is in the market for 12 lounge cars, 12 compartment sleeping cars and five dining cars.

Missouri Pacific has ordered 10 passenger coaches from St. Louis Car Co.

Union Oil Co. of California has ordered 60 tank cars from General American Tank Car Co.

M. A. Hanna Co., Cleveland, has purchased 20 mine cars from American Car & Foundry Co. for its subsidiary, the Susquehanna Collieries Co.

Reinforcing Steel

Awards Total 3100 Tons and Inquiries 2200 Tons

STATE OF MAINE, 300 tons, Highway Commission, to Bancroft & Martin Rolling Mills Co.

BOSTON, 100 tons, Edison Electric Illuminating Co. office building, to Truscon Steel Co.

ATLANTA, GA., 1800 tons, cold storage plant, to Kalman Steel Co.

PITTSBURGH, 100 tons, auditorium for H. J. Heinz Co., to Truscon Steel Co.

CHICAGO, 450 tons, Victor Lawson Memorial Y. M. C. A., to Concrete Steel Co.

REDLANDS, CAL., 120 tons, school, to Soule Steel Co.

SEATTLE, 250 tons, James Monroe School, to unnamed bidder.

Reinforcing Bars Pending

Inquiries for reinforcing steel bars include the following:

NEWINGTON, CONN., 500 tons, hospital.

MANTENO, ILL., 100 tons, State hospital building.

STATE OF PENNSYLVANIA, 1000 tons, Ohio River Boulevard and bridge in Allegheny County; bids open Jan. 28.

BALTIMORE, 560 tons, post office; N. P. Severin Co., Chicago, general contractor.

Taylor Society Meeting

The Metropolitan Section of the Taylor Society has postponed its next meeting from Jan. 16 to Thursday evening, Jan. 23. The program will follow a dinner at the Fraternities Club Building, 22 East Thirty-eighth Street, New York. The speaker of the evening will be Mrs. Lillian Gilbreth, president and treasurer, Frank B. Gilbreth, Inc., whose subject will be a "Report of the World Engineering Congress." The congress was held in Tokio, Japan, November, 1929.

Non-Ferrous Metal Markets

Copper Quiet and Steady—Tin Inactive—Lead Firm—Zinc Weaker

NEW YORK, Jan. 14.

Copper.—Domestic demand, which was fairly active a week ago, has tapered off decidedly. This may have been due to curiosity as to the December statistics, which were issued today. These showed a large increase in stocks of refined copper totaling 44,400 tons for December. The increase in blister copper was over 7400 tons, so that the total increase in copper above ground for December exceeded 51,800 tons. The December increase brings the total stocks to 171,320 tons. Some say that the increase was less than expected. Certain producers attribute it largely to the backing up of orders from fabricators, although the decrease in production was not as large as was hoped for. It is evident, from certain orders that are coming in, that fabricators need metal, as the earliest possible shipment is asked. Evidence in the hands of producers is said to indicate that stocks of fabricators are very low, but that their orders are coming in quite satisfactorily. Producers of wire and cable report good business. Cable producers have placed orders for lead for some months in advance, but have not covered for the copper. Some producers expect that the volume of buying will increase. This feeling is reinforced by information from Europe, which shows that stocks there are extremely low, with good prospects of sustained demand later. The reparations conference at the Hague is said to be interfering somewhat with German buying and possibly French. Prices still hold very firm at 18c., delivered in the Connecticut Valley, for electrolytic copper and at 18.30c., c.i.f. usual European ports, for export. Lake copper is reported only moderately active at 18c. to 18.12½c., delivered.

Tin.—Sales of spot Straits tin during the past week have been exceedingly light, and there is no life in the market. The principal news feature is continued increase at London in stocks of standard tin, which expanded 775 tons last week, bringing the total to 13,560 tons. This contrasts with 7388 tons a year ago. The London market is also very slow. There are free sellers in the East and good supplies of tin at London, so that there is very little need for active buying, particularly with nearby

THE WEEK'S PRICES, CENTS PER POUND FOR EARLY DELIVERY

	Jan. 14	Jan. 13	Jan. 11	Jan. 10	Jan. 9	Jan. 8
Lake copper, New York	18.12½	18.12½	18.12½	18.12½	18.12½	18.12½
Electrolytic copper, N. Y.*	17.75	17.75	17.75	17.75	17.75	17.75
Straits tin, spot, N. Y.	38.75	38.62½	....	39.25	39.12½	39.12½
Zinc, East St. Louis	5.20	5.25	5.25	5.25	5.25	5.30
Zinc, New York	5.55	5.60	5.60	5.60	5.60	5.65
Lead, St. Louis	6.10	6.10	6.10	6.10	6.10	6.10
Lead, New York	6.25	6.25	6.25	6.25	6.25	6.25

*Refinery quotation; price ¼c. higher delivered in the Connecticut Valley.

Rolled Products

List Prices, Per Lb., f.o.b. Mill

On Copper and Brass Products, Freight up to 75c. per 100 Lb. Allowed on Shipments of 500 Lb. or Over

Sheets—
- High brass ..... 23.25c.
- Copper, hot rolled ..... 26.75c.
- Zinc ..... 10.50c.
- Lead (full sheets) ..... 10.00c.

Seamless Tubes—
- High brass ..... 28.25c.
- Copper ..... 29.25c.

Rods—
- High brass ..... 21.25c.
- Naval brass ..... 24.00c.

Wire—
- Copper ..... 19.87½c.
- High brass ..... 23.75c.

Copper in Rolls ..... 26.75c.
Brazed Brass Tubing ..... 30.87½c.

Aluminum Products in Ton Lots

The carload freight rate is allowed to destinations east of Mississippi River and also to St. Louis on shipments to points west of that river.

- Sheets, 0 to 10 gage, 3 to 30 in. wide ..... 33.00c.
- Tubes, base ..... 42.00c.
- Machine rods ..... 34.00c.

Chicago Warehouse

(Prices Cover Trucking to Customers' Doors in City Limits)

	Base per Lb.
Sheets—	
High brass	23.25c.
Copper, hot rolled	27.75c.
Copper, cold rolled, 14 oz. and heavier	30.00c.
Zinc	10.75c.
Lead, wide	10.30c.
Seamless Tubes—	
Brass	28.25c.
Copper	29.25c.
Brass Rods	21.25c.
Brazed Brass Tubes	31.00c.

New York or Cleveland Warehouse

Delivered Prices, Base per Lb.

High brass	21.12½c. to 22.12½c.
Copper, hot rolled, base sizes	27.75c. to 28.75c.
Copper, cold rolled, 14 oz. and heavier, base sizes	30.00c. to 31.00c.
Seamless Tubes—	
Brass	26.00c. to 27.00c.
Copper	29.12½c. to 30.12½c.
Brass Rods	18.87½c. to 19.87½c.
Brazed Brass Tubes	29.12½c. to 30.12½c.

New York Warehouse

Delivered Prices, Base per Lb.

- *Zinc sheets (No. 9), casks* ..... 10.75c. to 11.25c.
- *Zinc sheets, open* ..... 11.50c. to 12.00c.

Metals from New York Warehouse

Delivered Prices, Per Lb.

- Tin, Straits pig ..... 40.75c. to 41.75c.
- Tin, bar ..... 42.75c. to 43.75c.
- Copper, Lake ..... 19.50c.
- Copper, electrolytic ..... 19.25c.
- Copper, casting ..... 19.00c.
- Zinc, slab ..... 6.75c. to 7.25c.
- Lead, American pig ..... 7.00c. to 7.50c.
- Lead, bar ..... 9.00c. to 9.50c.
- Antimony, Asiatic ..... 10.50c. to 11.00c.
- Aluminum No. 1 ingots for remelting (guaranteed over 99% pure) ..... 25.00c. to 26.00c.
- Alum. ingots, No. 12 alloy ..... 24.00c. to 25.00c.
- Babbitt metal, commercial grade ..... 25.00c. to 35.00c.
- Solder, ½ and ½ ..... 27.25c. to 28.25c.

Metals from Cleveland Warehouse

Delivered Prices, Per Lb.

- Tin, Straits pig ..... 44.00c.
- Tin, bar ..... 46.00c.
- Copper, Lake ..... 19.50c.
- Copper, electrolytic ..... 19.25c.
- Copper, casting ..... 18.75c.
- Zinc, slab ..... 8.00c. to 8.25c.
- Lead, American pig ..... 7.00c. to 7.20c.
- Lead, bar ..... 9.25c.
- Antimony, Asiatic ..... 16.00c.
- Babbitt metal, medium grade ..... 18.00c.
- Babbitt metal, high grade ..... 47.00c.
- Solder, ½ and ½ ..... 28.50c.

Old Metals, Per Lb., New York

Buying prices represent what large dealers are paying for miscellaneous lots from smaller accumulators and selling prices are those charged consumers after the metal has been properly prepared for their uses.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	14.75c.	16.25c.
Copper, hvy. and wire	14.50c.	16.00c.
Copper, light and bottoms	12.50c.	13.75c.
Brass, heavy	8.00c.	9.00c.
Brass, light	6.75c.	7.75c.
Hvy. machine composition	11.00c.	12.00c.
No. 1 yel. brass turnings	9.00c.	9.50c.
No. 1 red brass or compos. turnings	10.50c.	11.75c.
Lead, heavy	4.75c.	5.25c.
Lead, tea	3.75c.	4.25c.
Zinc	3.25c.	3.75c.
Sheet aluminum	11.00c.	13.00c.
Cast aluminum	10.00c.	12.00c.

tin at a discount. London prices today were about £2 per ton less than a week ago, with spot standard quoted at £174 7s. 6d., future standard at £177 12s. 6d. and spot Straits at £175 17s. 6d. The Singapore price was more than £7 per ton below that of a week ago at £180 5s. The New York market today was quiet, with spot Straits tin quoted at 38.75c., New York; about 150 tons changed hands, mostly for nearby delivery.

Lead.—Buying continues in moderate volume, with prices firm and unchanged. Business is about equally divided between January and February. The quotation in the outside market is 6.10c., St. Louis, and the contract price of the leading interest is 6.25c., New York.

Zinc.—Further weakness has developed, and prime Western slab zinc has sold as low as 5.20c., East St. Louis. There are some producers who will not meet this price and are asking from 5.25c. to 5.30c. A fair amount of demand is reported, and it is stated that a substantial order would possibly bring less than 5.20c., East St. Louis. By contrast, the ore market is strong and unchanged at $35 a ton, Joplin. Production last week was down to 4200 tons, a new low for the recent past, and shipments were only 9049 tons. This has reduced the surplus to about 31,000 tons, which is the smallest since June.

Antimony.—Chinese metal for spot delivery is a little higher at 8.50c., New York, duty paid. Futures are considerably lower at 8c., New York, due to threatened changes in the tariff.

Nickel.—Wholesale lots of ingot nickel are quoted at 35c. a lb., with shot nickel at 36c. and electrolytic nickel in cathodes at 35c.

Aluminum.—Virgin metal, 98 to 99 per cent pure, is obtainable at 23.90c. a lb., delivered.

Non-Ferrous Metals at Chicago

CHICAGO, Jan. 14.—This market is quiet in sales, but inquiries are more numerous and sellers expect a more active market at an early date. The old metal market is without feature.

Prices per lb., in carload lots: Lake copper, 18.50c.; tin, 39.75c.; lead, 6.20c.; zinc, 5.35c.; in less-than-carload lots, antimony, 9.50c. On old metals we quote copper wire, crucible shapes and copper clips, 14c.; copper bottoms, 11.50c.; red brass, 11.50c.; yellow brass, 8c.; lead pipe, 4.50c.; zinc, 3c.; pewter, No. 1, 24.50c.; tin foil, 22c.; block tin, 32c.; aluminum, 12.87½c.; all being dealers' prices for less-than-carload lots.

Inland Gal-Van-Alloy Steel Sheets

Gal-Van-Alloy steel sheets, recently placed on the market by the Inland Steel Co., Chicago, differ materially from ordinary galvanized sheets. The coating is completely alloyed with the base metal, there being no top layer of pure zinc as is the case with regular galvanized sheets. On this account Inland Gal-Van-Alloy sheets will withstand severe drawing or forming operations without peeling or flaking. The material will also stand considerably more heat than ordinary galvanized sheets, it is said, without flaking or cracking of the coating, and is much more suitable when any paint or the present-day popular high-finish enamels and lacquers are to be applied. The finished surface of a Gal-Van-Alloy sheet is considerably smoother than that of an ordinary galvanized sheet, it is asserted, and no trouble is encountered from peeling or cracking after painting, enameling or lacquering.

Because of these characteristics, Gal-Van-Alloy is especially recommended for such purposes as stoves, oven linings, refrigerators, outdoor signboards, steam tables, hot air furnace jackets, steam pipe and furnace elbows, gasoline tanks and washing machines.

Gal-Van-Alloy sheets are dull gray in appearance and can be supplied in 16 to 30-gage, inclusive. They are made in two grades, regular and special, the latter having a much smoother surface than the regular grade. They may also be had with an Inland copper alloy steel base, which is recommended where maximum corrosion-resisting qualities are desired.

Non-Ferrous Ingot Prices and Orders

CHICAGO, Jan. 14.—The Non-Ferrous Ingot Metal Institute reports the average prices per pound received by its membership on commercial grades of the six principal mixtures of ingot brass during the 28-day period ended Jan. 3. As there are, as yet, no generally accepted specifications for ingot brass, it must be understood that each item listed below is a compilation representing numerous sales of metal known to the trade by the designation shown, but each item, in reality, including many variations in formulas. Until the program of standardizing the principal specifications, now progressing in cooperation with the American Society for Testing Materials, is completed, the following specifications will be understood to refer to "commercial grades:"

	Cents
Commercial 80-10-10 (1 per cent impurities)	16.524
Commercial 78 per cent metal	14.879
Commercial 81 per cent metal	15.136
Commercial 83 per cent metal	15.305
Commercial 85-5-5-5	15.348
Commercial No. 1 yellow brass ingot	12.313

On Jan. 1, unfilled orders for brass and bronze ingots and billets on the books of the members of the institute amounted to a total of 9578 net tons. This compares with 10,696 tons on Dec. 1.

Sharp Drop in Industrial Use of Electricity

Productive activity in the United States, as measured by the use of electric power, is placed at 122.9 in November, compared with 134.6 in October and with 133.3 a year ago, by figures collected by *Electrical World*. The basis is the electric energy consumption of about 3600 manufacturing plants, in various industries and scattered throughout the United States. The figures are referred to 100 as the average of 1923-1925.

A sharp decline was recorded by the metal industry group, which dropped to 126.7 in November, compared with 145.1 a month earlier and 143.5 a year earlier. This drop was participated in by both the rolling mill and steel plant group and the ferrous and non-ferrous metal-working group. These registered in November 123.2 and 128.7 respectively, against about 145 for each in October and more than 140 for each a year ago. Automobiles showed the sharpest drop of all, going to 88.4, compared with 122.4 in October and with 127.1 in November, 1928.

Employment and Payroll Totals in Identical Plants in November and October (a)

	Establishments	Number on Payroll		Weekly Payroll (b)	
		November	October	November	October
Iron and steel	205	274,288	279,025	$8,413	$9,039
Foundry and machine shop	1,058	273,894	283,471	8,247	8,815
Machine tools	151	40,626	41,789	1,295	1,381
Hardware makers	72	31,444	32,573	813	862
Steam and hot-water appliances	104	32,012	32,223	904	978
Stoves	117	19,941	21,577	547	640
Structural ironwork	174	29,131	30,008	872	935
Cast iron pipe	39	11,113	11,913	257	284
Automobiles	215	324,451	392,141	10,088	12,941
Agricultural implements	82	28,120	27,828	804	816

(a) United States Bureau of Labor Statistics.
(b) Thousands of dollars; in all cases the decline in payroll was at a heavier percentage than that in numbers, which may have indicated greater prevalence of part-time operation.

PERSONAL

ROBERT M. DERBY, who has been identified with the Niles-Bement-Pond Co., New York, since his graduation from the Massachusetts Institute of Technology in 1901, has been elected a vice-president in charge of foreign sales. He has traveled widely and recently returned from a three months' trip in which he visited almost every European country, including Russia.

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LEWIS D. SPENCE, of the Brown & Sharpe Mfg. Co., Providence, R. I., will speak on "Modern Trend of Design and Use of Automatic Screw Machines and Equipment in the United States and Europe" at a joint meeting of the design and drafting sections and the machine shop section of the Providence Engineering Society at the rooms of the society, Providence, Jan. 28.

—

NORMAN C. NAYLOR has become vice-president, with headquarters at Chicago, of the American Locomotive Co. and of the Railway Steel Spring Co., New York, and J. D. FINN has been appointed secretary, succeeding W. SPENCER ROBERTSON, who has resigned to become president of the Permutit Co.

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MARVEL W. DALLAS, who has been associated with the E. C. Atkins & Co., Indianapolis, for the past five years, has become advertising manager, succeeding the late T. A. Carroll.

—

ERWIN K. BRIGHAM has been elected president of the North American Car Corporation to succeed his father, Henry H. Brigham, who died Jan. 4. Since 1920 Erwin K. Brigham has been vice-president and secretary and a director of the company.

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HARVEY M. RISSEEUW has resigned as vice-president and general manager of the Lakeside Bridge & Steel Co., Milwaukee, to become associated with Dick & Bauer, Inc., Milwaukee, specializing heretofore in the architectural and engineering design of theaters and public buildings, but which will extend that service to the industrial field. Mr. Risseeuw has been identified with the bridge and structural steel industry for more than 25 years.

—

WILLIAM F. RASCHE has resigned as director of educational work for General Motors Corporation, Pontiac, Mich., following his appointment as principal and assistant director of the Milwaukee Vocational Training School, where he was formerly an instructor. He was also formerly director of the vocational school at Cudahy, Wis., and professor in the vocational department of the University of Pittsburgh.

C. F. W. RYS, assistant to the president and metallurgical engineer of Carnegie Steel Co., Pittsburgh, sailed for Germany on Jan. 10, to attend the opening of the new department of iron and steel metallurgy at the School of Mines in Freiberg,



C. F. W. RYS

Saxony, from which school he was graduated in 1902. He is to deliver the Ledebur memorial address and the university will confer on him the honorary degree of doctor of engineering in recognition of his work in the United States.

—

ZAY JEFFRIES, consulting metallurgist, Cleveland, sailed on the Bremen on Jan. 11, for a brief business trip to Germany. He plans to return about Feb. 17. He will deliver the Howe memorial lecture at the February meeting of the American Institute of Mining and Metallurgical Engineers, Feb. 17 to 21.

—

BURNHAM FINNEY, for the past five years a member of the editorial staff of THE IRON AGE, has resigned to become assistant to the general manager of the Armco Culvert Manufacturers' Association, Middletown, Ohio. He has been associated with the New York office of THE IRON AGE for the past six months, but previously was editorial representative at Cincinnati.

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S. R. RECTANUS, who has been assistant to Calvin Verity, of the American Rolling Mill Co., has been elected vice-president in charge of operations. C. W. DAVIS, assistant treasurer, has been elected treasurer. E. N. MILLAN, chief of construction, has become chief engineer. These changes are in addition to others in the executive personnel announced in THE IRON AGE of Jan. 9, page 198.

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RAY M. HUDSON, recently assistant director of the Bureau of Standards at Washington, has been put in charge of the industrial department of the New England Council, with headquarters at the Statler Building, Boston, giving him larger scope than at first contemplated, when he was appointed secretary of the Massachusetts division of the council.

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W. W. LEFFLER, metallurgist, Central Alloy Steel Corporation, Massillon, Ohio, addressed the New Jersey chapter American Society for Steel Treating, Jan. 7, at Newark, N. J. In connection with his talk on heat treatment, the company's three-reel motion picture, "Making It Tough," was exhibited.

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GEORGE B. REED, formerly associated with the Endicott Forging & Mfg. Co., has been added to the sales engineering department of the Detroit Forging Co., Detroit.

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HERMAN A. HOLZ, American representative for Amsler and Alpha testing machines, has moved to larger quarters at 167 East Thirty-third Street, New York.

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C. W. DAVIS has been placed in charge of the newly-opened office, in the Chimes Building, Syracuse, N. Y., of the Carboloy Co., Inc., New York. This office will serve the northern, central and western parts of the State.

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L. E. FRIES has been appointed Cincinnati district manager of the United States Electrical Tool Co., Cincinnati, succeeding R. H. CLORE, who was recently appointed general sales manager.

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W. S. HARING, general manager of sales, Alan Wood Steel Co., Conshohocken, Pa., becomes vice-president in charge of Western sales on Feb. 1 and will make his headquarters in Los Angeles.

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W. HOMER HARTZ has been elected president of the Morden Frog & Crossing Works, Chicago, succeeding the late Irving T. Hartz.

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JAMES F. DONAHUE has been elected president and general manager of the Lamson & Sessions Co., an Ohio corporation that has been formed by the Lamson & Sessions Co., to operate its Chicago plant. This plant, together with a Cleveland plant, was taken over by the purchase of the Foster Bolt & Nut Co., Cleveland, of which Mr. Donahue was president. LEONARD F. COWELL, who has been western sales manager of the Lamson & Sessions Co., will continue in that capacity.

—

DR. J. S. UNGER, manager of the central research bureau, Carnegie Steel Co., Pittsburgh, will speak on "Castings" at a meeting of the Pittsburgh Foundrymen's Association at the Fort Pitt Hotel, Pittsburgh, on Jan. 20.

OBITUARY

ABRAM F. HUSTON, chairman of the board of the Lukens Steel Co., Coatesville, Pa., died of a heart attack at his home at Coatesville, Jan. 12. He was born at that city in 1852 and completed his schooling at Haverford College, Haverford, Pa. After his graduation in 1872, he entered the Lukens Rolling Mills (later Lukens Steel Co.) and went through the various departments, thereby gaining a complete knowledge of the business. He later served as purchasing agent and sales agent. On the death of his father 10 years later, he took control and in 1897 became president and continued in this capacity until 1925, when he was made chairman of the board. Mr. Huston was formerly president of the American Steel Manufacturers' Association, and at the time of his death was a director of several financial institutions.



A. F. HUSTON

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HERBERT DUPUY, for many years prominently identified with the Pittsburgh district iron and steel industry, and until 10 years ago chairman of the board of the Crucible Steel Co. of America, died at his home in Pittsburgh, on Jan. 10, aged 73 years. Born in Chicago, he later took up his residence in Philadelphia, and was graduated from Lehigh University, Bethlehem, Pa., in 1878. He immediately went to work in the laboratory of the Lucy Furnaces at Pittsburgh, then controlled by Andrew Carnegie. Later he went into business for himself, joining others in the erection of a crucible steel plant at McKees Rocks, Pa., which was absorbed by the Crucible Steel Co. of America in 1900. Although retaining a directorship in the Crucible company, he then became active in various other enterprises, notably the development of coking coal lands in the Connellsville and Klondike regions. He became chairman of the Crucible company following the death of William G. Park and continued in this position during the war years. Since his retirement he had been devoting his time principally to the Pennsylvania Rubber Co., of which he was president.

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THOMAS M. RICHARDS, New England sales manager of the Philadelphia & Reading Coal & Iron Co., died at his home in Marblehead, Mass., Jan. 7. He was a native of Philadelphia, and his father, the late Thomas M. Richards, was for many years vice-president of the company.

—

HARRY L. MONROE, since 1913 commercial vice-president of the General Electric Co., with headquarters in Chicago, died Jan. 10, at Dallas, Tex., where he had gone seeking improved health. Mr. Monroe entered the employ of the General Electric Co. in 1888. He was 61 years old.

—

WILLIAM L. JACOBY, president, Kellogg Switchboard & Supply Co., Chicago, died Jan. 11. He was born at Bethlehem, Pa., in 1873, and was graduated from Lehigh University as a mechanical engineer. He formerly was general manager of the Latrobe Steel Co. and he organized the Interocean Steel Co., Chicago Heights, Ill.

Building Contracts Slacken at Year End

Construction contracts in December are reported by F. W. Dodge Corporation at 19 per cent under the November total and 27 per cent below December, 1928. The figure is given as $316,368,000, of which residential construction accounted for $114,050,000, or 36 per cent; industrial projects, for $67,392,000; public works and utilities, for $51,821,000; commercial buildings, for $33,392,000; and educational buildings for $19,842,000.

In spite of the low volume of contracts placed, there was a considerable increase in the aggregate of contemplated projects reported, these amounting to $864,221,000, which is 20 per cent above the total for November and 19 per cent above December, 1928. Total contemplated new work for the year aggregated more than $8,886,000,000, which is 54 per cent above the amount of contracts. This is an indication that the year closed with a considerable volume of unsatisfied construction demand.

Contracts in the 37 eastern States during the year amounted to $5,754,290,000. This was a decrease of 13 per cent from 1928, which was a record year. The decrease, however, was not spread evenly over the different forms of construction. Residential construction showed the most severe decline, the total of $1,915,727,000 being 31 per cent below the 1928 total. Non-residential building as a whole was 3½ per cent above that for 1928.

Commercial and industrial building reached a combined total of $1,689,201,000, which was 11 per cent above 1928. Both these types of building show increases usually with general business activity on the upswing. Public works and utilities accounted for $1,248,342,000, which was 7 per cent below 1928. Public and institutional buildings reached $901,020,000, or 8 per cent less than in 1928.

General Electric Orders Gain

Orders received by the General Electric Co. in 1929 amounted to $445,802,519, compared with $348,848,512 for 1928, an increase of 28 per cent, according to an announcement by Gerard Swope, president. The orders for the fourth quarter of 1929 amounted to $108,398,049, compared with $88,162,049 for the last quarter of 1928, an increase of 23 per cent.

Production, Shipments and Orders of Finished Products and Raw Materials, Etc.

	November, 1929	October, 1929	November, 1928
Steel barrels, production(a), units	572,621	629,976	563,647
do., do., eleven months	7,713,901(b)	....	6,846,672
do., shipments	567,257	638,681	568,353
do., stocks, end of month	61,576	56,212	45,365
do., unfilled orders	993,601	901,621	957,117
Steel boilers, orders, units	1,239	1,712	1,416
do., do., eleven months	17,497	....	18,329
do., do., heating surface, sq. ft.	1,160,246	1,870,569	1,284,000(c)
do., do., do., eleven months	18,588,362	....	16,376,686
Babbitt metal, consumption, net tons(a)	2,261	2,759	2,815
Construction volume, index(d)	225	233	222
Coke production, by-product, (e) net tons	4,305,256	4,610,139	4,133,200
do., do., eleven months	49,278,642(b)	....	43,888,686
do., beehive	413,300	470,200	416,300
do., do., eleven months	5,670,100	....	3,979,300

(a)United States Department of Commerce. (b)New high record. (c)Approximate. (d)Associated General Contractors of America; index is based on 1913 average. (e)United States Bureau of Mines.

Trade Names of American Steels

Lists Arranged by Producers, the Names Themselves (Alphabetically) and by Product—Tool Steels and Castings Not Included

AN effort has been made in the subjoined tabulation to list and cross index the trade names and trade marks used by American steel producers. Within the limitations set, the list is believed to be reasonably complete, since the response from the industry has been very generous, all the producers of primary steel with but one or two exceptions having furnished the requested information.

No effort has been made to include high carbon or alloy steels used primarily for tools, either metal cutting or working tools, wood working tools or cutlery. An adequate list of these is already in existence in the handbook of the American Society for Steel Treating. That means that certain well known producers of steel are not listed among the companies represented, since their output is exclusively tool steels.

All plain carbon steels, alloy steels for use after heat treatment, and corrosion resisting steels are included, however, and in nearly every instance sufficient information is given about their chemical composition or physical properties to distinguish them from competing products of similar nature. It should be remembered in this connection, however, that no effort has been made to index *all* the products of the industry—only those rolled or drawn steels sold under distinctive trade names. That means that certain producers whose ingot tonnage reaches hundreds of thousands annually are unlisted, simply because their products are made to conform to published specifications and sold as such. It also excludes the output of steel foundries.

It should also be remembered that the list of trade names of sheet or wire mill products, for instance, includes only the products of rolling mills owned by steel producing plants.

Alphabetical List By Primary Steel Producers

ALAN WOOD STEEL CO., Conshohocken, Pa.
- **AW**—Floor plates and traffic treads.

ALLEGHENY STEEL CO., Brackenridge, Pa.
- **Allegheny**—General trade mark for carbon steel rolled products.
- **Allegheny Metal**—Low carbon chromium-nickel (18 and 8 per cent) a ductile corrosion and stain-resisting metal.
- **Ascoloy 33**—Low carbon iron with 12 to 16 per cent chromium, a ductile corrosion resisting metal.
- **Ascoloy 44**—Low carbon chromium-nickel (23.5 and 11.5 per cent), a ductile high temperature resistant metal.
- **Ascoloy 55**—Low carbon iron with 28 per cent chromium, a less ductile high temperature resistant metal.

AMERICAN ROLLING MILL CO. Middletown, Ohio.
- **Armco**, and **Armco** (on a triangle)—Ingot iron bars, sheets and wire.
- **Tran-Cor**—Special finish silicon steel sheets.
- **Stripsheets**—Sheet metal.

AMERICAN SHEET & TIN PLATE CO., Pittsburgh.
- **American**—All sheet and tin mill products.
- **Keystone**—Copper steel sheet and tin mill products.
- **Wellsville**—Polished steel sheets.
- **Apollo Best Bloom**—Galvanized sheets.

Special terne plate markings:
- **MF**—32-lb. coating, hand dipped, palm oil finish.
- **U. S. Eagle**—40-lb. coating.
- **Numethodd B** (40 lb.); D (30 lb.) and F (20 lb.) coatings.
- **American Old Style** 5A (40 lb); AAA (30 lb.); AA (25 lb.) and A (20 lb.) coatings.
- **Vitrenamel**—Black sheets for enameling.
- **Morton Polished**—Tin mill black sheets.
- **Cambridge Blue**—Tin mill blued sheets.

AMERICAN STEEL CO., Park Building, Pittsburgh.
- **Kelcar**—Double headed nails.
- **Kelkotters**—Cotter pins.
- **Kelnails**—Double headed nails.

AMERICAN STEEL & WIRE CO., Chicago.
- **American**—Wire.
- **American Quality**—Cold rolled strip steel and steel springs. (Cont.)

AMERICAN STEEL & WIRE CO. (Cont.)

Wirefence:
- **American, Anthony, Banner, Monitor, National, Prairie, Royal, Union Lock, U. S., Zinc Insulated.**

Barbed wire:
- **Glidden, Ellwood, Baker, Waukegan, Lyman.**
- **Premier**—Steel spring wire.
- **Premier Quality**—Wire spring.
- **Perfected**—Wire strand.
- **Perfection**—Door and gate springs.

ANDREWS STEEL CO., Newport, Ky.
- **ASCO**—Billets and bars, carbon and alloy steels.

APOLLO STEEL CO., Apollo, Pa.
- **Apolloy Metal**—Copper content sheets.
- **Highway Metal**—Copper content commercially pure iron sheets.

BABCOCK & WILCOX TUBE CO., New York.
- **Enduro A** and **KA2**—Seamless tubes and pipe.
- **Toncan Iron**—Seamless tubes and pipe.

BOURNE-FULLER CO., Cleveland.
- **Climax Alloy**—Staybolt steel.
- **B. F. Aetna**—Forging steels, alloy and carbon.
- **Upson**—Rods, bolts and rivets.

BRITISH EMPIRE STEEL CORPORATION, Montreal, Canada.
- **Besco**—Rails and trackwork, bars, wire and wire products.
- **Disco**—Rails and trackwork, bars, wire and wire products.
- **Scotia**—Forgings, shapes, sheets, bars.
- **PRM** (in diamond)—Bars and shapes.
- **Security**—Fencing.

BUFFALO BOLT CO., North Tonawanda, N. Y.
- **B** (in circle)—Bolt and wire rods.

CANADIAN TUBE & STEEL PRODUCTS LIMITED, Montreal, Canada.
- **Red Diamond**—Butt welded tubing up to 4 in.

CARNEGIE STEEL CO., Pittsburgh.
- **Carnegie**—Structural beams and shapes; floor plates.

CARPENTER STEEL CO., Reading, Pa.

Nickel-chrome steels, carbons in various ranges:
- **No. 408**—Ni 3.0, Cr 0.75.
- **No. 317**—Ni 1.75; Cr 1.0.
- **No. 314**—Ni 3.5, Cr 1.5.
- **No. 626**—Ni 4.5, Cr 1.5. (Cont.)

CARPENTER STEEL CO. (Cont.)
- **Sampson**—Ni 1.25, Cr 1.6.

Nickel steels, carbons in various ranges:
- **No. 547**—3.5 per cent Ni.
- **No. 500**—5.0 per cent Ni.
- **Presto**—Cr 1.40, C 1.05 steel for ball bearings.
- **No. 720**—Cr 0.90, V 0.20, C various.
- **Flexo Spring**—C 0.60, Mn 0.75, Si 2.0 for leaf springs.

Carpenter Stainless Steels:
- **No. 1**—C 0.10, Cr 13 "stainless iron."
- **No. 2**.—C 0.30, Cr 13 "stainless steel."
- **No. 3**—C 0.30, Cr 20, Cu 1.0, heat resistant.
- **No. 4**—C 0.10, Cr 18, Ni 9.5, austenitic.
- **No. 5**—C 0.10, Cr 14, Zirconium sulphide 0.40; stainless screw stock.

CENTRAL ALLOY STEEL CORPORATION, Massillon, Ohio.
- **Agathon**—Alloy bars and billets for heat treated parts.
- **Berloy**—Sheet metal products such as metal ceiling and architectural trim.
- **Toncan Metal**—Copper alloyed sheet iron.
- **Enduro KA2**—Ductile corrosion resistant metal.
- **Nitralloy**—Alloy steel, hardenable in ammonia.

CENTRAL IRON & STEEL CO., Harrisburg, Pa.
- **Central**—Plates, floor plates, flanged heads, blue annealed sheets.
- **Knobby**—Floor plates.

CHROME STEEL CORPORATION, Carteret, N. J.
- **Adamantine**—Heat treated steel balls for grinding mills.

COLONIAL STEEL CO., Pittsburgh.

Stainless steels and irons:
- **Type A**—C 0.33, Cr 14, "stainless steel."
- **Type B**—C 0.65, Cr 16.25, for harder articles.
- **Type I**—C 0.10, Cr 14, "stainless iron."
- **Type N**—C 0.18, Cr 18, Ni 8, austenitic steel.
- **Type U**—Type N plus 1.5 per cent copper and 1.5 per cent molybdenum, to resist chlorine and chlorides.

COLORADO FUEL & IRON CO., Denver, Colo.
- **Colorado**—Structural shapes, bars and rail mill products.

CONTINENTAL STEEL CORPORATION, Kokomo, Ind.
- **Pioneer**—Farm, poultry, lawn fence.
- **Red Devil**—Wire fencing. (Cont.)

CONTINENTAL STEEL CORPORATION (Cont.)

Kokomo—Farm fence.
Liberty—Poultry fence; copper bearing steel.
Victory—Fence with staple ties.
Continental—Nails and barbed wire.

CRUCIBLE STEEL CO. OF AMERICA, New York.

Alloy bars for heat treated parts:
Duplex No. 1—3½ Ni, 1¼ Cr; spring, machine and carburizing carbons.
Duplex No. 2—1½ Ni, 1 Cr; machine and carburizing carbons.
Duplex No. 3—3 Ni, 0.75 Cr; machine and carburizing carbons.
Alva Duplex—Chrome-vanadium; spring, forging and case hardening carbons.
Simplex—1.25 Ni, 0.60 Cr; forging and case hardening carbons.
Almo No. 1, 2 and 3—Chrome-molybdenum; (No. 1 highest alloy).
Max-el No. 1—Medium manganese, carbon 0.20.
Max-el No. 2—Medium manganese, carbon 0.40.
Max-el No. 3—Manganese-chromium, carbon 0.45.
Sanderson—Tungsten magnet steel.

Carbon steels:
Empire—Soft screw machine steel; carbon 0.08 to 0.18.
Aurora—Case hardening steel, carbon 0.15 to 0.25.
Calumet—Extra tough mild steel, carbon 0.25 to 0.35.
"B" Machinery—Annealed machine steel, carbon 0.33 to 0.40.
Climax—Machine steel with close carbon limits.
Regent—Acid open-hearth steel, carbon 0.40 to 0.45.
Ajax—Carbon 0.40 to 0.50, for strong unheat treated parts.
Niagara—Forging steel, carbon 0.45 to 0.55.
Corona—High carbon steel, small melt acid open-hearth.
Onyx—Carbon 0.60 to 0.70 and spring tempers, low sulphur and phosphorus.

Laminated steels:
C, enclosing the words **5 ply steel**—Laminated crucible and chromium steel for bank vaults.
JB—Jail bars.

Corrosion resistant metal:

Stainless Steel and Iron.

Atha's No. 2600—Ni:Cr:Si:Cu (22:8:-1.75:1) for high temperature service.
Rezistal—High nickel-chromium low carbon alloys containing 2 to 6 per cent silicon, for severe corrosion and temperature service.
Non-Cor—Ferronickels containing more than 25 per cent nickel.

CYCLOPS STEEL CO., Titusville, Pa.

Cyclops K-Rustless—C 0.40, Cr 8, W 8; non-staining.
Cyclops No. 17—C 0.40, Cr 8, Ni 20; non-magnetic steel for valves, turbine blades, and heat resistance.
Uniloy Special No. 1—C 0.20 max, Cr 18, Ni 8; austenitic steel.
Uniloy Special No. 2—C 0.20 max., Cr 21, Ni 12; austenitic steel for heat resistance to 1800 deg. Fahr.
Uniloy 1409—"Stainless iron."
Uniloy 1809—C 0.09 max., Cr 18, Ni 0.50 max, non-corrosive, ductile alloy.
Uniloy 2825—C 0.25 max., Cr 28, Ni 0.50 max., for heat resistance to 2000 deg. Fahr.

Stainless Steels:
Grade A; conventional analysis.
Grade B; 17 per cent chromium, 0.55 per cent carbon.

DELAWARE SEAMLESS TUBE CO., Auburn, Pa. (Subsidiary to Allegheny Steel Co.)

Allegheny Metal—Cold drawn seamless tubing.
Ascoloy 33—Cold drawn seamless tubing.
Delaware—Seamless mechanical tubing.

DETROIT SEAMLESS STEEL TUBE CO., Grand River, Detroit.

Detroit Tubes—Seamless steel mechanical tubing ½ in. to 6 in.

DOMINION ALLOY STEEL CORPORATION, Sarnia, Ontario, Canada.

Dascon—Galvanized flat and corrugated steel sheets.
Daskeen—Galvanized flat and corrugated copper alloy steel sheets.

DONNER STEEL CO., Buffalo, N. Y.

D—Bars and shapes in carbon and alloy steels, made in basic open-hearth or in electric furnaces.

DURIRON CO., Dayton, Ohio.

Durimet A—Iron-nickel-silicon alloy (70:25:5) containing 0.25 per cent carbon, primarily for hot weak sulphuric acid. (Cont.)

DURIRON CO. (Cont.)

Durimet B—Iron-nickel-chromium-silicon alloy (48:35:12:5) 0.25 per cent carbon, for corrosion resistant equipment.

EASTERN ROLLING MILL CO., Baltimore, Md.

Eastern—Sheet steel for automobile and furniture manufacture.
Normite—Normalized automobile body sheet steel for extra deep drawing purposes.

EDGEWATER STEEL CO., Pittsburgh, Pa.

E (in circle)—Rolled tires, rings, steel wheels.

EMPIRE STEEL CORPORATION, Mansfield, Ohio.

Empire—Special finished sheet steel.
Mansfield—Silicon steel electrical sheets.
Armelec—For auto starters.
Manelec—For fractional horsepower motors.
Motelec—For moderate sized motors.
Dynelec—For large equipment.
Tranelec A, B and C—For transformers.
Wabik—Vitreous enameling stock.
Waddell—Tack plate.

FIRTH-STERLING STEEL CO., McKeesport, Pa.

Sterling—Various corrosion resisting steels.
Stainless A—"Stainless steel."
Stainless B—C 0.65, Cr 16.5; for maximum hardness.
Stainless T—Low carbon, Cr 12.5; for turbine blades.
Stainless M—Malleable, low carbon, Cr over 16 per cent.
Super Stainless—Cr 18, Ni 8, austenitic steel.

FOLLANSBEE BROTHERS CO., Pittsburgh.

Follansbee Forge—General trade mark, all products.
Drawrite—Deep drawing black sheets and long ternes.
Lustro—Polished coated sheets.

Bright Tin Plates—In order from lightest to heaviest coating:
Furnace—Coke finish.
Clifton—Charcoal finish.
Haynes—Charcoal finish.
Rosedale—Charcoal finish.
Gilbert—Charcoal finish.
Banfield Best Bright—Charcoal finish.
Excello—Charcoal finish.

Terne Plates:
Raymond—8-lb. coating, oil finish.
Duquesne—Special coating, blue oil finish.
Lionel Old Style—15-lb. coating, bright dry finish.
Neville Old Style—20-lb. coating, bright dry finish.
Protection Old Process—25-lb. coating, bright dry finish.
Old Reliable Redipped—30-lb. coating, oil finish.
Scott's Extra Coated—40-lb. coating, palm oil finish.
Best Roofing—On base of hammer-forged copper-bearing steel.

GLOBE STEEL TUBES CO., Milwaukee, Wis.

Globe (and symbol)—Seamless steel tubes and tubular products.

GULF STATES STEEL CO., Birmingham, Ala.

Gulf—Bars, shapes, wire and wire products.
Southern—Wire fence and barbed wire.
Alabama—Light poultry fence and barbed wire.
Coosa—2-point barbed wire.
Cactus—4-point barbed wire.
Cherokee—Barbed wire, barbs ½ round.

HARRISBURG PIPE & PIPE BENDING Co., Harrisburg, Pa.

H (in double keystone)—Forged seamless steel cylinders, pipe couplings, forgings and hollow forgings.
Harrisburg—Billets, bars and small shapes in carbon and alloy steels.

HEPPENSTALL FORGE & KNIFE CO., Pittsburgh, Pa.

Diamond H—Acid open-hearth and electric induction furnace steels and forgings, carbon and alloy.
E. I. S.—Electric induction furnace carbon and alloy steels.

ILLINGWORTH STEEL CO., JOHN; Frankford, Philadelphia.

Machinery and alloy steels.
Frankford, JISCO, Oxford.

INLAND STEEL CO., Chicago.

Inland—Shapes, bars, plates, rails, sheets.
Inland Copper Alloy—Copper bearing soft steel sheet.
Inland Gal-Van-Alloy—Dull coated sheet steel, for forming roofing and painting.

JESSOP STEEL CO., Washington, Pa.

Corrosion resistant steels:
Sta-Gloss.
Hi-Gloss.
Duro-Gloss.
Armat—Carbon magnet steel.
V.T.S. Composit—Vault and jail bars and plates.

JONES & LAUGHLIN STEEL CORPORATION, Pittsburgh.

J&L—Shapes and bars; diamond reinforcing bars.
Jalcase—Medium manganese carburizing steels.
Junior—Structural I-beam sections.

KEYSTONE STEEL & WIRE CO., Peoria, Ill.

Red Brand—Wire fencing of copper bearing steel.
Defender—Barbed wire, two round barbs.
Hawthorne—Barbed wire, two flat barbs.
Ruthless—Barbed wire, four round barbs.
Kickapoo—Barbed wire, half round barbs.

LATROBE ELECTRIC STEEL CO., Latrobe, Pa.

Lesco—All products: electric furnace steels, forged, hot and cold rolled or drawn.

Alloy steels for heat treating:
Arrow—1.0 per cent chrome-vanadium forging steel; carbon 0.25 per cent.
Crown—Same, but carbon 0.45 per cent, for forgings and springs.
M-chrome—Annealed chromium steel for ball bearings.
L.V.S.—Low tungsten-chromium valve steel.
CWC—Magnet steel, containing chromium, tungsten and cobalt.

Heat resistant steels for die casting machine dies:
Aldivan—General purpose steel; chrome-vanadium steel of tool steel quality.
Lumdie—For aluminum die castings.
Z-T-Die—For lower melting zinc die castings.

Stainless iron and steel of customary analyses. Also:
Hy-Glo—Higher carbon and chromium.
Lusterite—Highest carbon for maximum hardness.

LUDLUM STEEL CO., Watervliet, N. Y.

Enduro A, KA2, KA2S and KA4—The latter for maximum corrosion resistance at high temperatures.
Enduro KM1 and S—Low chrome-nickel rustless steel (Cr 13.5, Ni 2 max., C 0.2 max.).
Neva Stain A and B—Cutlery grades of stainless steel.
Delhi Hard—Oil hardening stainless steel (Cr 17, Si 1.5, C 1.2).
Nitralloy G and H.
Silchrome 1, 2, F, NXT and CNS—Valve steels.

LUKENS STEEL CO., Coatesville, Pa.

Lukens—Plates, sheets, flanged, dished and elliptical heads; acid or basic open-hearth steel.

MAHONING VALLEY STEEL CO, Niles, Ohio.

Mahoning—Hot and cold rolled sheets.

MANGANESE STEEL FORGE CO., Philadelphia.

Rol-man—Rolled and forged manganese steel plates, bolts, and woven screen.

MICHIGAN STEEL CORPORATION, Detroit.

M—Extra deep drawing sheet steel.

MIDVALE CO., Nicetown, Philadelphia.

Nickel-chromium alloy steel bars and billets for heat treated parts:
Midvale No. 11—(High alloy).
Midvale No. 26—(Low alloy).
High nickel-chromium alloys for containers operating at high heats:
Midvale ATV1, ATV3, HR and V_2A:

NATIONAL TUBE CO., Pittsburgh.

National—Welded pipe, butt welded, lap welded, hammer welded.
National-Shelby—Seamless tubing, carbon and alloy steel.

NEWPORT ROLLING MILL CO., Newport, Ky.

Gohi—Genuine open-hearth iron with at least 0.20 per cent copper; black and galvanized sheet, roofing and formed products.
Kentucky—Copper bearing steel.
Licking Valley—Ingot iron.
Globe—Open-hearth steel sheet.

NEWTON STEEL CO, Youngstown, Ohio.

Newsteel—Uncoated stock for stamping and forming.

OHIO SEAMLESS TUBE CO., Shelby, Ohio.

Ohio Special—Seamless tubing of alloy and carbon steels.

PAGE STEEL & WIRE CO., Pittsburgh.
Page—Wire, strand, fence.
Armco—Ingot iron wire rods, wire products and welding wire.
Copperweld—Copper covered wire and wire products.
Protection—Industrial chain link fence.
Reliable—Residential chain link fence.
Lion—Staple tie farm fence.
IXL—Spring wire.
Trulay Strand—Preformed 7-wire galvanized strand.

PARKERSBURG IRON & STEEL CO., Parkersburg, W. Va.
ParkeRsburG—Blue and galvanized sheets and roofing.

PITTSBURGH STEEL CO., Pittsburgh.
Pittsburgh—Wire fence and wire products.

PITTSBURGH STEEL PRODUCTS CO. (subsidiary to Pittsburgh Steel Co.), Pittsburgh.
Pittsburgh—Seamless steel tubes and pipe ½ in. to 14 in.

REEVES MFG. CO., Dover, Ohio.
Reeves Premier—Black and galvanized sheets and formed roofing.

REPUBLIC IRON & STEEL CO., Youngstown, Ohio.
Republic—Pipe, sheet and tin plate, bars and bar products.
Toncan—Corrosion resistant pipe.

ROCKAWAY ROLLING MILL, Rockaway, N. J.
Rockaway—Billet reinforcing steel.

ROEBLING'S SONS CO., JOHN A., Trenton, N. J.
JAR (monogram in circle)—Steel wire, wire rope and wire products.
Roebling—Wire rope.
Blue center—Wire rope.

RUSTLESS IRON CORPORATION OF AMERICA, Baltimore, Md.
Rustless Iron—Low carbon, high chromium alloys made by direct reduction.
Defirust—Chromium 12 to 14 per cent.
Defistain—Chromium 17 to 19 per cent, nickel 7 to 9 per cent.
Defiheat—Chromium 25 to 30 per cent.

ROBERTSON STEEL & IRON CO., W. F., Cincinnati.
Norwood—Wire fencing.

SCULLIN STEEL CO.
SS (Intertwined, in circle)—Shapes, bars, tie plates, spikes.

SENECA IRON & STEEL CO., Buffalo, N. Y.
Seneca—Full finished sheets for automobiles, stampings and metal furniture.

SPANG, CHALFANT & CO, INC., Pittsburgh.
Spang—Welded pipe and oil country goods ⅛ in. to 24 in.
S or **Standard**—Seamless heat treated drill pipe, 1½ to 13⅜ in.
Simancro—Alloy steel seamless casing.

STANDARD STEEL WORKS CO., Philadelphia.
S (with two anchors in circle)—Rolled steel tires, wheels and forgings.

STANLEY WORKS, New Britain, Conn.
Stanley—Hot and cold rolled strip of carbon, chrome-molybdenum and copper coated steel.

STEEL CO. OF CANADA, Hamilton, Canada.
Stelco—All steel products.

SUPERIOR STEEL CORPORATION, Pittsburgh.
Superior—Hot and cold rolled strip steel.

TENNESSEE COAL, IRON & RAILROAD CO., Birmingham, Ala.
Tennessee—Rails and shapes, special welding steel, special threading steel, black and galvanized sheets.

TRANSUE & WILLIAMS STEEL FORGING CO., Alliance, Ohio.
TW (intertwined)—Steel forgings.

TREMONT NAIL CO., Wareham, Mass.
Tremont—Cut nails; hardened steel floor nails; ingot iron cut nails.

UNIVERSAL STEEL CO., Bridgeville, Pa.
Same brands as Cyclops Steel Co.

VANADIUM ALLOYS STEEL CO., Latrobe, Pa.
Vasco—Stainless and tool steels.
Crocar—High carbon, chromium steel for abrasion resistance.

WASHBURN WIRE CO., Phillipsdale, R. I.
3-W—Welding wire.
Eagle—Music Wire.
Paragon—Wire.

WEIRTON STEEL CO., Weirton, W. Va.
Weirton—Sheet and tin mill products; strip.

WHEELING STEEL CORPORATION, Wheeling, W. Va.
Wheeling Steel (in circle with fleur-de-lys)—Plate, shapes, bars, pipe, sheet and tin mill products, wire and wire products.
Cop-r-loy—Copper bearing steel, plate, shapes, bars, pipe, sheet and tin mill products, wire and wire products (formerly called "Ohio Metal").
Whitaker—Range boilers.

WICKWIRE BROTHERS, Cortland, N. Y.
Wickwire—Wire and miscellaneous wire products.
Cortland—Screen wire cloth, painted.
Gray-Wick—Screen wire cloth, dull finish galvanized and varnished.
Premier—Screen wire cloth, extra heavy wire galvanized before weaving.
Hen-Chick—Graduated poultry and rabbit fence.
Net-Wick—Poultry fence.

WICKWIRE SPENCER STEEL CO., N.Y.
Clinton—Welded concrete reinforcing fabric, wire lath, welded sheathing, screw wire, wire netting, perforated metal grilles.
American—Screen wire cloth.
Excelsior—Poultry and rabbit fence; wire cord and cable.
Wiscane—Perforated metal.
Black Label—Swedish steel, music wire for springs.
Gray Strand—Extra strong stiff wire rope.

WITHEROW STEEL CORPORATION, Pittsburgh.
W—(On roll, in diamond). Die rolled automobile axles, shafts and levers.

YOUNGSTOWN SHEET & TUBE CO., Youngstown, Ohio.
Youngstown—Pipe, sheet, shapes, wire.
Copperoid—Copper bearing pipe, sheet, shapes and wire.
Galvannealed—Coated sheets.
Extrudo—Bolt wire.
Nogald—Bolt wire.
Buckeye—Conduit.

Alphabetical list of Trade Names and Trade Marks

A

3-W—Welding wire—Washburn Wire Co.

Adamantine—Heat treated steel balls for grinding mills—Chrome Steel Corporation.

Agathon—Alloy bars and billets for heat treated parts—Central Alloy Steel Corporation.

Ajax—Carbon steel (0.40 to 0.50 per cent) for strong unheat treated parts—Crucible Steel Co. of America.

Alabama—Light poultry fence and barbed wire—Gulf States Steel Co.

Aldivan—Chrome-vanadium steel (tool steel quality made in electric furnace) for die casting dies—Latrobe Electric Steel Co.

Allegheny—General trade mark for steel products—Allegheny Steel Co.

Allegheny Iron—Commercially pure iron with 0.25 per cent copper—Allegheny Steel Co.

Allegheny Metal—Low carbon chromium-nickel (18 and 8 per cent), a ductile, corrosion and stain-resisting metal—Allegheny Steel Co.

Seamless tubing of Allegheny Metal—Delaware Seamless Tube Co.

Almo No. 1, 2 and 3—Chrome-molybdenum steels in various carbons. No. 1 has the highest alloy content—Crucible Steel Co. of America.

Alva Duplex—Chrome-vanadium steel in spring, forging and case hardening carbons—Crucible Steel Co. of America.

American—All sheet and tin mill products—American Sheet & Tin Plate Co.

American—Wire, barbed wire, fencing, netting, wire nails, rope, rail bonds, magnet wire, bale ties, wire hoops—American Steel & Wire Co.

American—Screen wire cloth—Wickwire Spencer Steel Co.

American Old Style—Terne plate AAAAA 40-lb. coating; AAA 30-lb. coating; AA 25-lb. coating; A 20-lb. coating—American Sheet & Tin Plate Co.

American Quality—Cold rolled strip steel, and steel springs—American Steel & Wire Co.

Anthony—Wire fence—American Steel & Wire Co.

Apollo Best Bloom—Galvanized steel and copper steel sheets—American Sheet & Tin Plate Co.

Apolloy Metal—Copper content steel sheets—Apollo Steel Co.

Armat—Carbon magnet sheet steel—Jessop Steel Co.

Armco, and **Armco** (on a triangle)—Ingot iron bars, sheets and wire—American Rolling Mill Co.

Armco—Ingot iron wire rods, wire products and welding wire—Page Steel & Wire Co.

Armelec—Silicon sheet steel for auto starters—Empire Steel Corporation.

Arrow—1.0 per cent chrome-vanadium forging steel, carbon 0.25 per cent (electric furnace)—Latrobe Electric Steel Co.

Asco—Billets and bars, carbon and alloy steels—Andrews Steel Co.

Ascoloy 33—Low carbon iron with 12 to 16 per cent chromium; a ductile, corrosion resisting metal—Allegheny Steel Co.

Seamless tubing—Delaware Seamless Tube Co.

Ascoloy 44—Low carbon chromium-nickel 23.5 and 11.5 per cent), a ductile high temperature resistant metal—Allegheny Steel Co.

Ascoloy 55—Low carbon iron with 28 per cent chromium; a less ductile high temperature resistant metal—Allegheny Steel Co.

Atha's No. 2600—Nickel-chromium-silicon-copper-steel (22:8:1.75:1) for high temperature service—Crucible Steel Co. of America.

ATV1 and **ATV3**—See Midvale.

Aurora—Case hardening steel, carbon 0.15 to 0.25 per cent—Crucible Steel Co. of America.

AW—Floor plates and traffic treads—Alan Wood Steel Co.

B

B (in circle)—Bolt and wire rods—Buffalo Bolt Co.

Baker—Barbed wire—American Steel & Wire Co.

Banfield Best Bright—Next to heaviest coating, charcoal finish, bright tin plate—Follansbee Brothers Co.

Banner—Poultry fence—American Steel & Wire Co.

Berloy—Sheet metal products such as metal ceiling and architectural trim—Central Alloy Steel Corporation.

Besco—Rails and trackwork, bars, wire and wire products—British Empire Steel Corporation.

Best Roofing—Terne plate, base of hammer-forged copper-bearing steel—Follansbee Brothers Co.

B.F. Aetna—Forging steel bars and billets, alloy and carbon—Bourne-Fuller Co.

Black Label—Swedish steel music wire for springs—Wickwire Spencer Steel Co.

Blue Center—Wire rope—John A. Roebling's Sons Co.

"B" Machinery—Annealed machine steel, carbon 0.35 to 0.40 per cent—Crucible Steel Co. of America.

Buckeye—Conduit—Youngstown Sheet & Tube Co.

C

C (enclosing the words) **5 ply steel**—Laminated crucible and chromium steel for bank vaults—Crucible Steel Co. of America.

Cactus—4-point barbed wire—Gulf States Steel Co.

Calumet—Extra tough mild steel, carbon 0.25 to 0.35 per cent—Crucible Steel Co. of America.

Cambridge Blue—Tin mill blued sheets—American Sheet & Tin Plate Co.

Carnegie—Structural beams and shapes; floor plates—Carnegie Steel Co.

Carpenter 314—Nickel-chromium steel (3.5 and 1.5 per cent) in various carbons—Carpenter Steel Co.

Carpenter 317—Nickel-chromium steel (1.75 and 1.0 per cent) in various carbons—Carpenter Steel Co.

Carpenter 408—Nickel-chromium steel (3.0 and 0.75 per cent) in various carbons—Carpenter Steel Co.

Carpenter 500—5 per cent nickel steel—Carpenter Steel Co.

Carpenter 547—3.5 per cent nickel steel—Carpenter Steel Co.

Carpenter 626—Nickel-chromium steel (4.5 and 1.5 per cent) in various carbons—Carpenter Steel Co.

Carpenter 720—Chrome-vanadium steel in various carbons (Cr 0.90, V 0.20)—Carpenter Steel Co.

Central—Plates, floor plates, flanged heads, blue annealed sheets—Central Iron & Steel Co.

Cherokee—Barbed wire, barbs ½ round—Gulf States Steel Co.

Clifton—Lightest coating, charcoal finish, bright tin plate—Follansbee Brothers Co.

Climax—Carbon machine steel with close chemical limits—Crucible Steel Co. of America.

Climax Alloy—Staybolt steel—Bourne-Fuller Co.

Clinton—Welded fabric and lath; wire screens and netting; perforated metal grilles—Wickwire Spencer Steel Co.

CNS—Silchrome valve steel—Ludlum Steel Co.

Colorado—Structural shapes, bars, and rail mill products—Colorado Fuel & Iron Co.

Continental—Wire, nails and barbed wire—Continental Steel Corporation.

Coosa—2-point barbed wire—Gulf States Steel Co.

Copperoid—Copper bearing pipe, sheet, shapes and wire—Youngstown Sheet & Tube Co.

Copperweld—Copper covered wire and wire products—Page Steel & Wire Co.

Cop-r-loy—Copper bearing steel, plate, shapes, bars, pipe, sheet and tin mill products, wire and wire products—Wheeling Steel Corporation.

Corona—High carbon steel, made in small melt acid open-hearth furnaces—Crucible Steel Co. of America.

Cortland—Screen wire cloth, painted—Wickwire Brothers.

Crocar—Abrasion resistant steel, C 2.15, Cr 12, Co 0.75, V 0.75—Vanadium-Alloy Steel Co.

Crown—1.0 per cent chrome-vanadium steel, carbon 0.45 per cent, for forgings and springs (electric furnace)—Latrobe Electric Steel Co.

CWC—Chromium-tungsten-cobalt magnet steel (electric furnace)—Latrobe Electric Steel Co.

Cyclops K-Rustless—Non-staining steel C 0.40, Cr 8, W 8—Cyclops Steel Co.

Cyclops No. 17—C 0.40, Cr 8, Ni 20—Non-magnetic steel for valves and heat resistance—Cyclops Steel Co.

D

D—Bars and shapes, carbon and alloy steels—Donner Steel Co.

Dascon—Galvanized flat and corrugated steel sheets—Dominion Alloy Steel Corporation.

Daskeen—Galvanized flat and corrugated copper alloy steel sheets—Dominion Alloy Steel Corporation.

Defender—Barbed wire, two round barbs—Keystone Steel & Wire Co.

Defiheat Rustless Iron—Low carbon; chromium 25 to 30 per cent; made by direct reduction—Rustless Iron Corporation of America.

Defirust Rustless Iron—Low carbon; chromium 12 to 14 per cent, made by direct reduction—Rustless Iron Corporation of America.

Defistain Rustless Iron—Low Carbon; chromium 17 to 19 per cent, nickel 7 to 9 per cent, made by direct reduction—Rustless Iron Corporation of America.

Delaware—Seamless mechanical tubing (carbon steel)—Delaware Seamless Tube Co.

Delhi Hard—Oil hardening stainless steel (Cr 17, Si 1.5, C 1.2)—Ludlum Steel Co.

Detroit Tubes—Seamless steel mechanical tubing, ½ in. to 6 in.—Detroit Seamless Steel Tube Co.

Diamond H—Acid open-hearth and electric induction furnace steels and forgings, carbon and alloy steels—Heppenstall Forge & Knife Co.

Disco—Rails and trackwork, bars, wire and wire products—British Empire Steel Corporation.

Drawrite—Deep drawing sheets and long ternes—Follansbee Brothers Co.

Duplex No. 1—Nickel-chromium steel (3½ and 1½ per cent) in spring, machine and carburizing carbons—Crucible Steel Co. of America.

Duplex No. 2—Nickel-chromium steel (1½ and 1 per cent) in machine and carburizing carbons—Crucible Steel Co. of America.

Duplex No. 3—Nickel-chromium steel (3.0 and 0.75 per cent) in machine and carburizing carbons—Crucible Steel Co. of America.

Duquesne—Terne plate, special coating, blue oil finish—Follansbee Brothers Co.

Durimet A—Iron-nickel-silicon alloy (70:25:5) containing 0.25 per cent carbon, primarily for hot weak sulphuric acid—Duriron Co.

Durimet B—Iron-nickel-chromium-silicon alloy (48:35:12:5) 0.25 per cent carbon, for corrosion resistant equipment—Duriron Co.

Duro-Gloss—Medium carbon stainless steel—Jessop Steel Co.

Dynelec—Silicon sheet steel for large electrical equipment—Empire Steel Corporation.

E

E (in circle)—Rolled tires, rings, steel wheels—Edgewater Steel Co.

Eagle—Music wire—Washburn Wire Co.

Eastern—Sheet steel for automobile and furniture manufacturing—Eastern Rolling Mill Co.

E. I. S.—Electric induction furnace carbon and alloy steels—Heppenstall Forge & Knife Co.

Ellwood—Barbed wire—American Steel & Wire Co.

Empire—Soft screw machine steel; carbon 0.08 to 0.18 per cent—Crucible Steel Co. of America.

Empire—Black and galvanized sheets, and special finishes for automobile and furniture manufacture—Empire Steel Corporation.

Enduro A—Corrosion resistant metal containing carbon under 0.10 per cent, chromium 16.5 to 18.5 and silicon 1.0.

Trade name "Enduro" owned by Krupp Nirosta Co., and licensed to several producing companies.

Seamless tubes of Enduro—Babcock & Wilcox Tube Co.

Enduro KA2 and KA2S—Corrosion resistant metal containing carbon under 0.15 per cent, chromium 16.5 to 19.5 and nickel 7.0 to 10.0 per cent.

Enduro KA4—Alloy for sulphite liquors (Cr 17-20, Ni 9-12, Mo 3-4, C low)—Ludlum Steel Co.

Enduro KM1 and S—Low chrome-nickel rustless steel (Cr 13.5, Ni 2 max., C 0.2 max.)—Ludlum Steel Co.

Excello—Heaviest coating, charcoal finish, bright tin plate—Follansbee Brothers Co.

Excelsior—Woven wire fencing; wire cord and cable—Wickwire Spencer Steel Co.

Extrudo—Bolt wire—Youngstown Sheet & Tube Co.

F

Flexo Spring—Silico-manganese steel for leaf springs—Carpenter Steel Co.

Follansbee Forge—Steel sheets (black, tin, terne, electrical, high silicon) made of hammer-forged open-hearth steel—Follansbee Brothers Co.

Frankford—Machinery and alloy steels—John Illingworth Steel Co.

Furnace—Coke finish bright tin plate—Follansbee Brothers Co.

G

Galvannealed—Coated sheets—Youngstown Sheet & Tube Co.

Gilbert—Medium coating, charcoal finish, bright tin plate—Follansbee Brothers Co.

Glidden—Barbed wire—American Steel & Wire Co.

Globe (and symbol)—Seamless steel tubes and tubular products—Globe Steel Tubes Co.

Globe—Open-hearth steel sheet—Newport Rolling Mill Co.

Gohi—Genuine open-hearth iron with at least 0.20 per cent copper. Black and galvanized sheet, roofing and formed products—Newport Rolling Mill Co.

Gray Strand—Extra strong, stiff wire rope—Wickwire Spencer Steel Co.

Gray-Wick—Screen wire cloth, dull finish galvanized and varnished—Wickwire Brothers.

Gulf—Bars, shapes, wire and wire products—Gulf States Steel Co.

H

H (in Double Keystone)—Forged seamless steel cylinders, pipe couplings, hollow forgings and drop forgings—Harrisburg Pipe & Pipe Bending Co.

Harrisburg—Billets, bars and small shapes in carbons and alloy steels—Harrisburg Pipe & Pipe Bending Co.

Hawthorne—Barbed wire, two flat barbs—Keystone Steel & Wire Co.

Haynes—Next to lightest coating, charcoal finish, bright tin plate—Follansbee Brothers Co.

Hen-Chick—Graduated poultry fence—Wickwire Brothers.

Highway Metal—Copper content commercially pure iron sheets—Apollo Steel Co.

Hi-Gloss—Low carbon, "stainless iron"—Jessop Steel Co.

HR—See Midvale.

Hy-Glo—Stainless steel with extra carbon and chromium (electric furnace)—Latrobe Electric Steel Co.

I

Inland—Shapes, bars, plates, rails, sheets—Inland Steel Co.

Inland Copper Alloy—Copper bearing soft steel sheet—Inland Steel Co.

Inland Gal-Van-Alloy—Dull coated sheet steel, for forming and painting—Inland Steel Co.

IXL—Spring wire—Page Steel & Wire Co.

J

Jalcase—Medium manganese carburizing steel—Jones & Laughlin Steel Corporation.

J&L—Shapes and bars; diamond reinforcing bars—Jones & Laughlin Steel Corporation.

JAR (monogram in circle)—Steel wire, wire rope and wire products—John A. Roebling's Sons Co.

JB—Laminated soft and chromium steel jail bars—Crucible Steel Co. of America.

JISCO—Machinery and alloy steel—John Illingworth Steel Co.

Junior—Small structural beams—Jones & Laughlin Steel Corporation.

K

Kelcar—Double headed nails—American Steel Co.

Kelkotters—Cotter pins—American Steel Co.

Kelnails—Double headed nails—American Steel Co.

Kentucky—Copper bearing steel sheet—Newport Rolling Mill Co.

Keystone—Copper steel sheet and tin mill products—American Sheet & Tin Plate Co.

Kickapoo—Barbed wire, half round barbs—Keystone Steel & Wire Co.

Knobby—Floor plates—Central Iron & Steel Co.

Kokomo—Farm fence—Continental Steel Corporation.

L

Lesco—Electric furnace carbon and alloy steels, forged, hot and cold rolled or drawn—Latrobe Electric Steel Co.

Liberty—Poultry fence, copper bearing steel—Continental Steel Corporation.

Licking Valley—Ingot iron sheet—Newport Rolling Mill Co.

Lion—Staple tie farm fence—Page Steel & Wire Co.

Lionell Old Style—Terne plate, 15-lb. coating, bright dry finish—Follansbee Brothers Co.

Lukens—Plates, sheets, flanged, dished and elliptical heads; acid or basic open-hearth steel—Lukens Steel Co., Coatesville, Pa.

Lumdie—Electric furnace steel for dies for aluminum die castings—Latrobe Electric Steel Co.

Lusterite—Highest carbon stainless steel for maximum hardness (electric furnace)—Latrobe Electric Steel Co.

Lustro—Polished nickel, copper, brass or tin coated steel sheets—Follansbee Brothers Co.

L.V.S.—Low tungsten-chromium valve steel (electric furnace)—Latrobe Electric Steel Co.

Lyman—Barbed wire—American Steel & Wire Co.

M

M—Extra deep drawing sheet steel—Michigan Steel Corporation.

Mahoning—Hot and cold rolled steel sheets—Mahoning Valley Steel Co.

Manelec—Silicon sheet steel for fractional horse power motors—Empire Steel Corporation.

Mansfield—Silicon steel electrical sheets—Empire Steel Corporation.

Max-el (No. 1, 2 and 3)—Medium manganese steels; carbon 0.20, 0.40 and 0.45 per cent respectively—Crucible Steel Co. of America.

M-Chrome — Annealed chromium steel (electric furnace) for ball bearings—Latrobe Electric Steel Co.

MF—Terne plate, 32-lb. coating, hand dipped, palm oil finish—American Sheet & Tin Plate Co.

Midvale ATV1—Fe:Ni:Cr:Mn alloy (51½:36:11:1½) for containers operating at 1200 deg. Fahr.—Midvale Co.

Midvale ATV3 — Fe:Ni:Cr:W:Mn alloy 53½:27½:14:3½:1½) for containers operating at 1740 deg. Fahr.—Midvale Co.

Midvale HR—Fe:Cr:Ni:W alloy (69:20:7:4) for containers operating at 1830 deg. Fahr.—Midvale Co.

Midvale No. 11—Alloy steel bars and billets for heat treated parts—Carburizing grade with 0.15 carbon (Ni 3.0; Cr 0.6 to 0.9)—Forging grades, carbons 0.35 to 0.50 as required—Midvale Co.

Midvale No. 26—Alloy steel bars and billets for heat treated parts. Nickel 1.5, chromium 0.5, carbon 0.15 to 0.35 per cent as required—Midvale Co.

Midvale V2A—Fe:Cr:Ni alloy (73½:18:8½) Low carbon, ductile alloy for high temperature service—Midvale Co.

Monitor—Wire fence—American Steel & Wire Co.

Morton Polished—Tin mill black sheets—American Sheet & Tin Plate Co.

Motelec—Silicon sheet steel for moderate sized motors—Empire Steel Corporation.

N

National—Wire fence—American Steel & Wire Co.

National—Welded pipe, butt welded, lap welded, hammer welded—National Tube Co.

National-Shelby—Seamless tubing, carbon and alloy steel—National Tube Co.

Net-Wick — Poultry fence—Wickwire Brothers.

Neva Stain A and B—Cutlery grades of stainless steel—Ludlum Steel Co.

Neville Old Style—Terne plate, 20-lb. coating, bright dry finish—Follansbee Brothers Co.

Newsteel — Uncoated sheet steel for stamping and forming—Newton Steel Co.

Niagara—Forging steel, carbon 0.45 to 0.55—Crucible Steel Co. of America.

Nirosta—See Enduro.

Nitralloy—Steels of special analysis for surface hardening by ammonia. Usually contain 1.25 per cent aluminum, 1.50 per cent chromium and 0.20 per cent molybdenum. Nitralloy G has 0.35 per cent carbon; Nitralloy H has 0.25 per cent carbon.

Trade name Nitralloy owned by Aubert & Duval Freres, Paris, France, who have licensed several producers.

Nogald—Bolt wire—Youngstown Sheet & Tube Co.

Non-Cor—Ferronickels containing more than 25 per cent nickel—Crucible Steel Co. of America.

Normite—Normalized automobile body steel sheet for extra deep drawing—Eastern Rolling Mill Co.

Norwood—Wire fencing—W. F. Robertson Steel & Iron Co.

Numethodd—Terne plate: B 40-lb. coating; D 30-lb. coating; F 20-lb. coating—American Sheet & Tin Plate Co.

NXT — Silchrome valve steel — Ludlum Steel Co.

O

Ohio Metal—Former name of Cop-r-loy.

Ohio Special—Seamless tubing of alloy and carbon steels—Ohio Seamless Tube Co.

Old Reliable Redipped—Terne plate, 30-lb. coating, oil finish—Follansbee Brothers Co.

Onyx—Carbon steel (carbon 0.60 to 0.70 per cent and spring tempers) low in sulphur and phosphorus — Crucible Steel Co. of America.

Oxford—Machinery and alloy steel—John Illingworth Steel Co.

P

Page—Wire and wire products—Page Steel & Wire Co.

Paragon—Wire—Washburn Wire Co.

ParkeRsburG—Blue and galvanized sheets and roofing—Parkersburg Iron & Steel Co.

Perfected—Wire strand, door and gate springs—American Steel & Wire Co.

Pioneer—Farm, poultry and lawn fence—Continental Steel Corporation.

Pittsburgh — Seamless steel tubes and pipe, ½ to 14 in.—Pittsburgh Steel Products Co.

Pittsburgh—Wire fence and wire products—Pittsburgh Steel Co.

Prairie—Wire fence—American Steel & Wire Co.

Premier—Screen wire cloth, extra heavy wire, galvanized before weaving—Wickwire Brothers.

Premier—Spring steel wire—American Steel & Wire Co.

Premier Quality—Wire springs—American Steel & Wire Co.

Presto—Ball bearing steel (Cr 1.40, C 1.05) —Carpenter Steel Co.

PRM (in diamond)—Bars and shapes—British Empire Steel Corporation.

Protection—Industrial chain link fence—Page Steel & Wire Co.

Protection Old Process—Terne plate, 25-lb. coating, bright dry finish—Follansbee Brothers Co.

R

Raymond—Terne plate, 8-lb. coating, oil finish—Follansbee Brothers Co.

Red Brand—Wire fencing of copper bearing steel—Keystone Steel & Wire Co.

Red Devil—Wire fencing—Continental Steel Corporation.

Red Diamond—Butt welded tubing up to 4 in.—Canadian Tube & Steel Products Limited.

Reeves Premier—Black and galvanized steel sheets and formed roofing—Reeves Mfg. Co.

Regent—Acid open-hearth steel, carbon 0.40 to 0.45 per cent—Crucible Steel Co. of America.

Reliable—Residential chain link fence—Page Steel & Wire Co.

Republic—Pipe, sheet and tin plate, bars and bar products—Republic Iron & Steel Co.

Rezistal—High nickel-chromium irons (low in carbon) containing 2 to 6 per cent silicon, for severe corrosion and temperature service—Crucible Steel Co. of America.

Rockaway—Billet steel reinforcing bars—Rockaway Rolling Mill.

Roebling—Wire rope—John A. Roebling's Sons Co.

Rol-man—Rolled and forged manganese steel (Mn 11 to 14 per cent, C 1.0 to 1.3 per cent) plates, bolts and woven screen—Manganese Steel Forge Co.

Rosedale — Medium coating, charcoal finish, bright tin plate—Follansbee Brothers Co.

Royal—Wire fence—American Steel & Wire Co.

Rustless Iron—Low carbon high chromium alloys made by direct reduction—Rustless Iron Corporation of America.

Ruthless—Barbed wire, four round barbs—Keystone Steel & Wire Co.

S

S—Seamless heat treated drill pipe, 1½ to 13⅜ in.—Spang, Chalfant & Co., Inc.

S (with two anchors in circle)—Rolled steel tires, wheels and forgings—Standard Steel Works Co.

Sampson—Nickel-chromium steel (1.25 and 1.6 per cent) in various carbons—Carpenter Steel Co.

Sanderson—Tungsten magnet steel—Crucible Steel Co. of America.

Scotia—Forgings, shapes, sheets, bars—British Empire Steel Corporation.

Scott's Extra Coated—Terne plate, 40-lb. coating, palm oil finish—Follansbee Brothers Co.

Security—Fencing—British Empire Steel Corporation.

Seneca—Full finished sheets for automobiles, stampings and metal furniture—Seneca Iron & Steel Co.

Shelby or National-Shelby—Seamless tubing, carbon and alloy steel—National Tube Co.

Silchrome 1, 2, F, NXT and CNS—Valve Steels (basic composition: (Cr 8.25, Sr 3.5, C 0.50)—Ludlum Steel Co.

Simancro—Alloy steel seamless casing—Spang, Chalfant & Co., Inc.

Simplex—Low nickel-chromium steel (1.25 and 0.60 per cent) in forging and case hardening carbons—Crucible Steel Co. of America.

Southern—Wire fence and barbed wire—Gulf States Steel Co.

Spang—Welded pipe and oil country goods, ⅛-in. to 24 in.—Spang, Chalfant & Co., Inc.

SS (intertwined, in circle)—Shapes, bars, tie plates, spikes—Scullin Steel Co.

Sta-Gloss—Stainless tool and cutlery steel —Jessop Steel Co.

Stainless Iron—Generally contains less than 0.12 per cent carbon and over 11½ per cent chromium.

Stainless Steel—Generally contains from 0.25 to 0.35 per cent carbon and 12 to 13½ per cent chromium.

Trade mark "Stainless" owned by American Stainless Steel Co., Pittsburgh, and licensed to many producing companies. Certain producers of stainless iron and steels operate under licenses from Chemical Foundation.

Standard—Seamless heat treated drill pipe, 1½ to 13⅜ in.—Spang, Chalfant & Co., Inc.

Stanley—Hot and cold rolled strip of carbon, chrome-molybdenum and copper coated steel—Stanley Works.

Stelco—Shapes, bars, wire, wire products, pipe, sheet mill products—Steel Co. of Canada.

Sterling — Various corrosion resisting steels—Firth-Sterling Steel Co.

Strip sheets—Sheet metal—American Rolling Mill Co.

Superior—Hot and cold rolled strip steel—Superior Steel Corporation.

T

Tennessee—Rails and structural shapes; special welding steel, special threading steel, black and galvanized sheets —Tennessee Coal, Iron & Railroad Co.

Toncan—Ingot iron, corrosion resistant sheet (0.25 per cent maximum total impurities) with at least 0.40 per cent copper and 0.07 per cent molybdenum —Central Alloy Steel Corporation.

Pipe made of Toncan iron—Republic Iron & Steel Co.

Seamless tubes of Toncan Iron—Babcock & Wilcox Tube Co.

Tran-Cor—Special finish silicon steel sheets—American Rolling Mill Co.

Tranelec A, B, or C—Silicon sheet steel for transformers—Empire Steel Corporation.

Tremont—Cut nails; hardened steel floor nails; ingot iron cut nails—Tremont Nail Co.

Trulay Strand—Preformed 7-wire galvanized strand—Page Steel & Wire Co.

TW (intertwined)—Steel forgings—Transue & Williams Steel Forging Co.

U

Uniloy 1409—"Stainless Iron"—Cyclops Steel Co.

Uniloy 1809—C 0.09 max., Cr 18, Ni 0.50 max. Non-corrosive ductile alloy—Cyclops Steel Co.

Uniloy 2825—C 0.25 max., Cr 28, Ni 0.50 max. For heat resistance to 2000 deg. Fahr.—Cyclops Steel Co.

Uniloy Special No. 1—C 0.20 max., Cr 18, Ni 8. Austenitic steel—Cyclops Steel Co.

Uniloy Special No. 2—C 0.20 max., Cr 21, Ni 12. Austenitic steel for heat resistance to 1800 deg. Fahr.—Cyclops Steel Co.

Union Lock—Wire fence—American Steel & Wire Co.

Upson—Rods, bolts and rivets—Bourne-Fuller Co.

U. S.—Wire fence—American Steel & Wire Co.

U. S. Eagle—Terne plate, 40-lb. coating—American Sheet & Tin Plate Co.

V

V_2A—See Midvale.

Vasco—Stainless steel—Vasco A; 14 per cent chromium, normal carbon. Vasco B; 16.5 per cent chromium, high carbon—Vanadium-Alloys Steel Co.

Victory—Fence with staple ties—Continental Steel Corporation.

Vitrenamel—Black sheets for enameling—American Sheet & Tin Plate Co.

V. T. S. Composit—Vault and jail bars and plates—Jessop Steel Co.

W

W (on roll in diamond)—Die rolled automobile axles, shafts and levers—Witherow Steel Corporation.

Wabik—Vitreous enameling stock—Empire Steel Corporation.

Waddell—36-in. tack plate up to 16 gage—Empire Steel Corporation.

Waukegan—Barbed wire—American Steel & Wire Co.

Weirton—Sheet and tin mill products; strip—Weirton Steel Co.

Wellsville—Polished steel sheets—American Sheet & Tin Plate Co.

Wheeling Steel (in circle with fleur-de-lys)—Plate, shapes, bars, pipe, sheet and tin mill products, wire and wire products—Wheeling Steel Corporation.

Whitaker—Range boilers, galvanized—Wheeling Steel Corporation.

Wickwire—Wire and miscellaneous wire products—Wickwire Brothers.

Wiscane—Perforated metal — Wickwire Spencer Steel Co.

Y

Youngstown—Pipe, sheet, shapes and wire—Youngstown Sheet & Tube Co.

Z

Zinc Insulated—Wire fence—American Steel & Wire Co.

Z-T-Die—Electric furnace steel for dies for zinc and white metal die castings—Latrobe Electric Steel Co.

Trade Names Rearranged by Principal Classifications of Product

Alloy Bars and Billets for Heat-Treated Parts

(Electrical Sheets listed under Sheet Mill Products)

314—Nickel-chromium steel (3.5 and 1.5 per cent), in various carbons—Carpenter Steel Co.

317—Nickel-chromium steel (1.75 and 1.0 per cent), in various carbons—Carpenter Steel Co.

408—Nickel-chromium steel (3.0 and 0.75 per cent), in various carbons—Carpenter Steel Co.

500—5 per cent nickel steel—Carpenter Steel Co.

547—3.5 per cent nickel steel—Carpenter Steel Co.

626—Nickel-chromium steel (4.5 and 1.5 per cent) in various carbons—Carpenter Steel Co.

720—Chrome-vanadium steel in various carbons (Cr 0.90, V 0.20)—Carpenter Steel Co.

Agathon—All S.A.E. and special analyses—Central Alloy Steel Corporation.

Almo No. 1, 2 and 3—Chrome-molybdenum steels in various carbons. No. 1 has the highest alloy content—Crucible Steel Co. of America.

Alva Duplex—Chrome-vanadium steel in spring, forging and case hardening carbons—Crucible Steel Co. of America.

Arrow—1.0 per cent chrome-vanadium forging steel, carbon 0.25 per cent (electric furnace)—Latrobe Electric Steel Co.

Asco—Billets and bars, especially for oil well tools—Andrews Steel Co.

C (enclosing the words 5 ply steel)—Laminated crucible and chromium steel for bank vaults—Crucible Steel Co. of America.

Carpenter—Alloy and stainless steels—Carpenter Steel Co.

Crocar—Abrasion resistant steel (C 2.15, Cr 12, Co 0.75, V 0.75)—Vanadium-Alloys Steel Co.

Crown—1.0 per cent chrome-vanadium steel, carbon 0.45 per cent, for forgings and springs (electric furnace)—Latrobe Electric Steel Co.

CWC — Chromium-tungsten-cobalt magnet steel (electric furnace)—Latrobe Electric Steel Co.

D—Bars and shapes in S.A.E. and special analysis; basic open-hearth or electric—Donner Steel Co.

Duplex No. 1—Nickel-chromium steel (3½ and 1½ per cent) in spring, machine and carburizing carbons—Crucible Steel Co. of America.

Duplex No. 2—Nickel-chromium steel (1¼ and 1 per cent) in machine and carburizing carbons—Crucible Steel Co. of America.

Duplex No. 3—Nickel-chromium steel (3.0 and 0.75 per cent) in machine and carburizing carbons—Crucible Steel Co. of America.

E.I.S.—Electric induction furnace alloy steels and forgings — Heppenstall Forge & Knife Co.

Flexo Spring—Silico-manganese steel for leaf springs—Carpenter Steel Co.

Frankford—Alloy bars—John Illingworth Steel Co.

Harrisburg — Billets, bars and small shapes in various alloys—Harrisburg Pipe & Pipe Bending Co.

Jalcase—Medium manganese carburizing steel—Jones & Laughlin Steel Corporation.

JB—Laminated soft and chromium steel jail bars—Crucible Steel Co. of America.

JISCO—Alloy bars—John Illingworth Steel Co.

L.V.S.—Low tungsten-chromium valve steel (electric furnace)—Latrobe Electric Steel Co.

Max-el No. 1, 2 and 3—Medium manganese steels; carbon 0.20, 0.40 and 0.45 per cent, respectively—Crucible Steel Co. of America.

M-chrome — Annealed chromium steel (electric furnace) for ball bearings—Latrobe Electric Steel Co.

Midvale No. 11—High alloy—Midvale Co.

Midvale No. 26—Low alloy—Midvale Co.

Nitralloy—Steels of special analysis for surface hardening by ammonia. Trade name Nitralloy owned by Aubert & Duval Freres, Paris, France, who have licensed several producing companies.

Oxford — Alloy bars—John Illingworth Steel Co.

Presto—Ball bearing steel (Cr 1.40, C 1.05)—Carpenter Steel Co.

Sampson—Nickel-chromium steel (1.25 and 1.6 per cent) in various carbons—Carpenter Steel Co.

Sanderson—Tungsten magnet steel—Crucible Steel Co. of America.

Simplex—Low nickel-chromium steel (1.25 and 0.60 per cent) in forging and case hardening carbons—Crucible Steel Co. of America.

Bars, Billets, Shapes and Plates of Carbon Steel

Ajax—Carbon steel (0.40 to 0.50 per cent) for strong unheat-treated parts—Crucible steel Co. of America.

Allegheny—Shapes and plates of carbon steel—Allegheny Steel Co.

Armco, and **Armco** on a triangle—Ingot iron billets, bars, forgings, plates and shapes—American Rolling Mill Co.

Asco—Billets and bars, especially for oil well tools—Andrews Steel Co.

Aurora—Case hardening steel, carbon 0.15 to 0.25 per cent—Crucible Steel Co. of America.

AW—Diamond rolled floor plates, traffic treads—Alan Wood Steel Co.

B (in circle)—Bolt and wire rods—Buffalo Bolt Co.

Besco—Rails and trackwork; bars—British Empire Steel Corporation.

B. F. Aetna—Forging steel bars and billets, alloy and carbon—Bourne-Fuller Co.

"B" Machinery—Annealed machine steel, carbon 0.33 to 0.40 per cent—Crucible Steel Co. of America.

Calumet—Extra tough mild steel, carbon 0.25 to 0.35 per cent—Crucible Steel Co. of America.

Carnegie—Structural beams and shapes; floor plates—Carnegie Steel Co.

Central—Plates, floor plates, flanged heads, bars and billets—Central Iron & Steel Co.

Climax—Carbon machine steel with close chemical limits—Crucible Steel Co. of America.

Climax Alloy—Staybolt steel—Bourne-Fuller Co.

Colorado—Structural shapes, bars and rail mill products—Colorado Fuel & Iron Co.

Copperoid—Copper bearing pipe, sheet, shapes and wire—Youngstown Sheet & Tube Co.

Cop-r-loy—Copper bearing steel billets, plates, rods—Wheeling Steel Corporation.

Corona—High carbon steel, made in small melt acid open-hearth furnaces—Crucible Steel Co. of America.

D—Bars and shapes; basic open-hearth or electric—Donner Steel Co.

Disco—Rails and trackwork; bars—British Empire Steel Corporation.

Empire—Soft screw machine steel; carbon 0.08 to 0.18 per cent—Crucible Steel Co. of America.

Extrudo—Bolt wire—Youngstown Sheet & Tube Co.

Frankford—Machine steel—John Illingworth Steel Co.

Gulf—Gulf States Steel Co.

Harrisburg — Billets, bars and small shapes—Harrisburg Pipe & Pipe Bending Co.

Inland—Shapes, bars, plates, rails—Inland Steel Co.

J & L—Shapes and bars; diamond reinforcing bars—Jones & Laughlin Steel Corporation.

JISCO—Machine steel—John Illingworth Steel Co.

Junior—Small structural beams—Jones & Laughlin Steel Corporation.

Knobby—Floor plates—Central Iron & Steel Co.

Lukens—Plates, flanged, dished and elliptical heads; acid or basic open-hearth steel—Lukens Steel Co.

Niagara—Forging steel, carbon 0.45 to 0.55—Crucible Steel Co. of America.

Nogald—Bolt wire—Youngstown Sheet & Tube Co.

Onyx—Carbon steel (carbon 0.60 to 0.70 per cent and spring tempers), low in sulphur and phosphorus—Crucible Steel Co. of America.

Oxford—Machine steel—John Illingworth Steel Co.

Regent—Acid open-hearth steel, carbon 0.40 to 0.45 per cent—Crucible Steel Co. of America.

Republic—Bars and bar products—Republic Iron & Steel Co.

Rockaway—Billet steel reinforcing bars—Rockaway Rolling Mill.

Rol-man—Rolled and forged manganese steel—Manganese Steel Forge Co.

Scotia—Angle irons, bars, structural shapes—British Empire Steel Corporation.

SS (intertwined, in circle)—Shapes, bars, tie plates, spikes—Scullin Steel Co.

Stelco—Shapes and bars—Steel Co. of Canada.

Tennessee—Rails and structural shapes; special welding steel, special threading steel—Tennessee Coal, Iron & Railroad Co.

Upson—Rods, bolts and rivets—Bourne-Fuller Co.

V.T.S. Composit—Vault and jail bars and plates—Jessop Steel Co.

Wheeling Steel (in circle with fleur-de-lys)—Billets, plates, rods—Wheeling Steel Corporation.

Youngstown—Pipe, sheet, shapes and wire—Youngstown Sheet & Tube Co.

Corrosion and Heat Resistant Steels, Available in Shapes, Plates, Sheets or Tubes

Aldivan—Chrome-vanadium steel of tool steel quality, made in electric furnace, for die casting dies—Latrobe Electric Steel Co.

Allegheny Metal—Low carbon chromium-nickel (18 and 8 per cent), a ductile, corrosion and stain resisting metal—Allegheny Steel Co.

Ascoloy 33, 44 and 55—Corrosion resistant alloys—Allegheny Steel Co.

Atha's No. 2600—Nickel-chromium-silicon-copper steel (22:8:1.75:1) for high temperature service—Crucible Steel Co. of America.

Carpenter Stainless Steels.
No. 1—Conventional stainless iron.
No. 2—Conventional stainless steel.
No. 3—C 0.30, Cr 20, Cu 1.0, for heat resistance.
No. 4—C 0.10, Cr 18, Ni 9.5, austenitic steel.
No. 5—C 0.10, Cr 14, screw machine stock, containing 0.40 per cent zirconium sulphide—Carpenter Steel Co.

Colonial Stainless Steels and Irons.
Type A—C 0.33, Cr 14, "stainless steel."
Type B—C 0.65, Cr 16.25, for harder articles.
Type I—C 0.10, Cr 14, "stainless iron."
Type N—C 0.18, Cr 18, Ni 8, austenitic steel.
Type U—Type N plus 1.5 per cent copper and 1.5 per cent molybdenum, to resist chlorine and chlorides—Colonial Steel Co.

Cyclops K-Rustless—Non-staining steel. C 0.40, Cr 8, W 8—Cyclops Steel Co.

Cyclops No. 17—C 0.40, Cr 8, Ni 20. Non-magnetic steel for valves, turbine blades and heat resistance—Cyclops Steel Co.

Cyclops Stainless Steels—
Grade A: Conventional analysis.
Grade B: 17 per cent chromium, 0.55 per cent carbon—Cyclops Steel Co.

Defiheat—Low carbon, chromium 25 to 30 per cent—Rustless Iron Corporation of America.

Defirust—Low carbon, chromium 12 to 14 per cent—Rustless Iron Corporation of America.

Defistain—Low carbon, chromium 17 to 19 per cent, nickel 7 to 9 per cent—Rustless Iron Corporation of America.

Delhi Hard—Oil hardening stainless steel (Cr 17, Si 1.5, C 1.2—Ludlum Steel Co.

Durimet A—Iron-nickel-silicon alloy (70:25:5), containing 0.25 per cent carbon, primarily for hot, weak sulphuric acid—Duriron Co.

Durimet B—Iron-nickel-chromium-silicon alloy (48:35:12:5) 0.25 per cent carbon, for corrosion resistant equipment—Duriron Co.

Duro-Gloss — Medium-carbon stainless steel—Jessop Steel Co.

Enduro A—Contains less than 0.10 per cent carbon; chromium 16.5 to 18.5 and silicon 1.0 per cent.

Enduro KA2 and KA2S—Contains carbon under 0.15 per cent, chromium 16.5 to 19.5, and nickel 7.0 to 10.0 per cent. Trade name "Enduro" owned by Krupp Nirosta Co., and licensed to several producing companies.

Enduro KA4—For hot sulphite liquors (Cr 17-20, Ni 9-12, Mo 3-4, C low)—Ludlum Steel Co.

Enduro KM1 and S—Low chrome-nickel rustless steel (Cr 13.5, Ni 2 max., C 0.2 max.)—Ludlum Steel Co.

Hi-Gloss—Low carbon, "stainless iron"—Jessop Steel Co.

Hy-Glo—Stainless steel with extra carbon and chromium (electric furnace)—Latrobe Electric Steel Co.

Lumdie—Electric furnace steel for dies for aluminum die castings—Latrobe Electric Steel Co.

Lusterite—Highest carbon stainless steel for maximum hardness (electric furnace)—Latrobe Electric Steel Co.

Midvale ATV1—Fe:Ni:Cr:Mn alloy (51½:36:11:1½). For containers operating at 1200 deg. Fahr.—Midvale Co.

Midvale ATV3—Fe:Ni:Cr:W:Mn alloy (53½:27½:14:3½:1½). For containers operating at 1740 deg. Fahr.—Midvale Co.

Midvale HR—Fe:Cr:Ni:W alloy (69:20:7:4). For containers operating at 1830 deg. Fahr.—Midvale Co.

Midvale V2A—Fe:Cr:Ni alloy (73½:18:8½). Low carbon, ductile alloy for high temperature service—Midvale Co.

Neva Stain A and B—Cutlery grades of stainless steel—Ludlum Steel Co.

Non-Cor—Ferronickels containing more than 25 per cent nickel, for heat resistance—Crucible Steel Co. of America.

Rezistal—High nickel-chromium irons (low in carbon), containing 2 to 6 per cent silicon, for severe corrosion and temperature service—Crucible Steel Co. of America.

Silchrome 1, 2, F, NXT and CNS—Valve steels (basic composition: (Cr 8.25, Si 3.5, C 0.5)—Ludlum Steel Co.

Sta-Gloss—Stainless tool and cutlery steel—Jessop Steel Co.

Stainless Iron—Generally contains less than 0.12 per cent carbon and over 11½ per cent chromium—Trade mark "Stainless" owned by American Stainless Steel Co., Pittsburgh, and licensed to many producing companies.

Stainless Steel—Generally contains from 0.25 to 0.35 per cent carbon and 12 to 13½ per cent chromium—Trade mark "Stainless" owned by American Stainless Steel Co., Pittsburgh, and licensed to many producing companies.

Sterling Stainless Steels:
Stainless A—"Stainless steel."
Stainless B—C 0.65, Cr 16.5, for maximum hardness.
Stainless T—Low carbon, Cr 12.5, for turbine blades.
Stainless M—Malleable, low carbon, Cr over 16 per cent.
Super Stainless—Cr 18, Ni 8, austenitic steel—Firth-Sterling Steel Co.

Uniloy Stainless Steels:
1409—"Stainless iron."
1809—Non-corrosive, ductile alloy (C 0.09 max., Cr 18, Ni 0.50 max.).
2825—Heat resistant to 2000 deg. Fahr.; C 0.25 max., Cr 28, Ni 0.50 max.
Special No. 1—Austenitic steel; C 0.20 max., Cr 18, Ni 8.
Special No. 2—Austenitic steel for heat resistance to 1800 deg. Fahr.; C 0.20 max., Cr 21, Ni 12—Cyclops Steel Co.

Vasco A—14 per cent chromium stainless steel, and

Vasco B—16.5 per cent chromium stainless steel—Vanadium-Alloys Steel Co.

Z-T-Die—Electric furnace steel for dies for zinc and white metal die castings—Latrobe Electric Steel Co.

Forgings

Adamantine—Heat treated seel balls for grinding mills—Chrome Steel Corporation.

Armco and Armco (on a triangle)—Ingot iron forgings—American Rolling Mill Co.

Diamond H—Forgings of acid open-hearth and electric induction furnace steels—Heppenstall Forge & Knife Co.

E (in circle)—Rolled tires, rings, steel wheels—Edgewater Steel Co.

H (in double keystone)—Forged seamless steel cylinders, pipe couplings, hollow forgings and drop forgings, in plain and alloy steels—Harrisburg Pipe & Pipe Bending Co.

Midvale—Forgings in carbon and alloy steel—Midvale Co.

S (with two anchors in circle)—Rolled steel tires, wheels, and forgings—Standard Steel Works Co.

Scotia—Axles, crankshafts, railway and ship forgings—British Empire Steel Corporation.

TW—Transue & Williams Steel Forging Co.

W (on roll, in diamond)—Die rolled automobile axles, shafts and levers—Witherow Steel Corporation.

Pipe and Seamless Tube, in Carbon Steel, Copper Bearing Steel, and Rust Resisting Irons

Allegheny—Lap welded boiler tubes, 2 in. to 6 in.—Allegheny Steel Co.

Allegheny Metal—Seamless tubing of corrosion resisting alloy—Delaware Seamless Tube Co.

Ascoloy 33—Seamless tubing of corrosion resisting alloy—Delaware Seamless Tube Co.

Buckeye—Conduit—Youngstown Sheet & Tube Co.

Copperoid—Copper bearing pipe—Youngstown Sheet & Tube Co.

Cop-r-loy—Copper bearing steel pipe (black and galvanized); oil country goods—Wheeling Steel Corporation.

Delaware—Carbon steel, seamless mechanical tubing—Delaware Seamless Tube Co.

Detroit Tubes—Seamless mechanical tubing, ⅛ in. to 6 in.—Detroit Seamless Steel Tube Co.

Enduro A and KA2—Seamless tubes and pipe—Babcock & Wilcox Tube Co.

Etna—Trade mark superseded by "Spang."

Globe (and symbol)—Cold drawn or hot finished seamless steel tubes, 1 in. to 6 in.—Globe Steel Tubes Co.

H (in double keystone)—Forged seamless steel cylinders, pipe couplings and hollow forgings in plain and alloy steels—Harrisburg Pipe & Pipe Bending Co.

National—Butt, lap and hammer welded pipe—National Tube Co.

National-Shelby—Seamless tubing of carbon and alloy steels—National Tube Co.

Ohio Special—Seamless tubing of carbon and alloy steels—Ohio Seamless Tube Co.

Pittsburgh—Seamless steel tube and pipe, ⅛ to 14 in.—Pittsburgh Steel Products Co.

Red Diamond—Butt welded tubing up to 4 in.—Canadian Tube & Steel Products, Limited.

Republic—Butt and lap welded pipe—Republic Iron & Steel Co.

S—Heat treated seamless drill pipe, 1½ to 13⅜ in.—Spang, Chalfant & Co., Inc.

Shelby or National-Shelby—Carbon and alloy steel seamless tubing—National Tube Co.

Simancro—Alloy steel casing (seamless)—Spang, Chalfant & Co., Inc.

Spang—Welded pipe and oil country goods, ⅛ in. to 24 in.—Spang, Chalfant & Co., Inc.

Standard—Heat treated drill pipe, seamless, 1½ to 13⅜ in.—Spang, Chalfant & Co., Inc.

Steico—Conduit, railway signal, and scale free cold straightened pipe—Steel Co. of Canada.

Toncan—Pipe made of copper-molybdenum bearing iron—Republic Iron & Steel Co.

Toncan Iron—Seamless tube and pipe—Babcock & Wilcox Tube Co.

Wheeling Steel (in circle with fleur-de-lys)—Black and galvanized pipe; oil country goods—Wheeling Steel Corporation.

Youngstown—Butt and lap welded pipe—Youngstown Sheet & Tube Co.

Sheet and Sheet Mill Products

American—All varieties of sheet mill products; also electrical sheets—American Sheet & Tin Plate Co.

Allegheny—Black and galvanized products; deep drawing and furniture stock—Allegheny Steel Co.

Allegheny Iron—Commercially pure iron sheets with 0.25 per cent copper—Allegheny Steel Co.

Apollo Best Bloom—Galvanized steel and copper steel sheets—American Sheet & Tin Plate Co.

Apolloy Metal—Copper bearing steel sheets—Apollo Steel Co.

Armat—Carbon magnet steel sheet—Jessop Steel Co.

Armco and Armco (on a triangle)—Ingot iron, plain and formed, coated and uncoated sheets—American Rolling Mill Co.

Armelec—Silicon steel for auto starters—Empire Steel Corporation.

Berloy—Formed products, such as metal ceiling and architectural trim—Central Alloy Steel Corporation.

Central—Blue annealed sheets—Central Iron & Steel Co.

Clinton—Perforated metal grilles—Wickwire Spencer Steel Co.

Copperoid—Copper bearing pipe, sheets, shapes and wire—Youngstown Sheet & Tube Co.

Copperoid—Copper bearing, sheets, black, blue annealed, full finished, galvanized—Wheeling Steel Corporation.

Dascon—Galvanized flat and corrugated sheets—Dominion Alloy Steel Corporation.

Daskeen—Galvanized flat and corrugated copper alloy steel sheets—Dominion Alloy Steel Corporation.

Drawrite—Deep drawing stock—Follansbee Brothers Co.

Dynelec—Silicon steel for large electrical equipment—Empire Steel Corporation.

Eastern—For automobile and furniture manufacturing—Eastern Rolling Mill Co.

Empire—Black and galvanized; special finishes for automobile and furniture manufacture—Empire Steel Corporation.

Follansbee Forge—Black, electrical and high silicon sheets made of hammer-forged open-hearth steel—Follansbee Brothers Co.

Galvannealed — Coated sheets — Youngstown Sheet & Tube Co.

Globe—Open-hearth steel sheets and sheet mill products—Newport Rolling Mill Co.

Gohi—Genuine open-hearth iron with at least 0.20 per cent copper; black and galvanized sheet, roofing and formed products—Newport Rolling Mill Co.

Highway Metal—Copper bearing commercially pure iron sheets—Apollo Steel Co.

Inland—Extra soft open-hearth steel—Inland Steel Co.

Inland Copper Alloy—Copper bearing soft steel sheet—Inland Steel Co.

Inland Gal-Van-Alloy—Dull coated sheet steel, for forming and painting—Inland Steel Co.

Kentucky—Copper bearing steel; sheet mill products—Newport Rolling Mill Co.

Keystone—Copper steel sheets and sheet mill products—American Sheet & Tin Plate Co.

Licking Valley—Ingot Iron and Sheet Mill Products—Newport Rolling Mill Co.

M—Extra deep drawing sheet steel—Michigan Steel Corporation.

Manelec—Silicon steel for fractional horsepower motors—Empire Steel Corporation.

Mansfield—Silicon steel electrical sheets in eight grades—Empire Steel Corporation.

Mahoning—Hot and cold rolled steel sheets—Mahoning Valley Steel Co.

Motelec—Silicon sheet steel for moderate sized motors—Empire Steel Corporation.

Newsteel—Uncoated stock for stamping and forming—Newton Steel Co.

Normite—Normalized automobile body stock for extra deep drawing—Eastern Rolling Mill Co.

ParkeRsburG—Blue and galvanized sheets and roofing—Parkersburg Iron & Steel Co.

Reeves Premier—Black and galvanized steel sheets and formed roofing—Reeves Mfg. Co.

Republic—Black and galvanized sheets—Republic Iron & Steel Co.

Scotia—Sheet mill products—British Empire Steel Corporation.

Seneca—Full finished sheets for automobiles, stampings and metal furniture—Seneca Iron & Steel Co.

Stanley—Hot and cold rolled strip of copper, chrome-molybdenum and copper coated steel—Stanley Works.

Stelco—Cold rolled, blue annealed and galvanized steel sheets—Steel Co. of Canada.

Strip Sheets—Sheet metal formed of iron and steel—American Rolling Mill Co.

Superior—Hot and cold rolled strip steel—Superior Steel Corporation.

Tennessee—Black and galvanized sheets; open-hearth and copper bearing—Tennessee Coal, Iron & Railroad Co.

Toncan—Corrosion resistant low-alloy ingot iron sheets, black, galvanized and formed; lath—Central Alloy Steel Corporation.

Tranelec A, B, or C—Silicon steel for transformers—Empire Steel Corporation.

Tran-Cor—Special finish silicon steel sheets—American Rolling Mill Co.

Vitrenamel—Black sheets for enameling—American Sheet & Tin Plate Co.

Wabik—Vitreous enameling stock—Empire Steel Corporation.

Waddell—36-in. tack plate up to 16 gage—Empire Steel Corporation.

Wellsville—Polished sheets—American Sheet & Tin Plate Co.

Weirton—Sheet, black and coated, in various finishes—Weirton Steel Co.

Whitaker—Range boilers, galvanized—Wheeling Steel Corporation.

Wheeling Steel (in circle with fleur-de-lys)—Black, blue annealed, galvanized and full finished sheets—Wheeling Steel Corporation.

Wiscane—Perforated metal grilles—Wickwire Spencer Steel Co.

Youngstown—Sheet mill products—Youngstown Sheet & Tube Co.

Tin and Terne Plate

American—All varieties of tin plate and terne roofing—American Sheet & Tin Plate Co.

American Old Style AAAAA—40-lb coating terne; **AAA**—30-lb. coating terne; **AA**—25-lb. coating terne; **A**—20-lb. coating terne—American Sheet & Tin Plate Co.

Banfield Best Bright—Next to heaviest coating, charcoal finish, bright tin plate—Follansbee Brothers Co.

Best Roofing—Terne plate, base of hammer-forged copper-bearing steel—Follansbee Brothers Co.

Cambridge Blue—Tin mill blued sheets—American Sheet & Tin Plate Co.

Clifton—Lightest coating, charcoal finish, bright tin plate—Follansbee Brothers Co.

Cop-r-loy—Copper bearing steel, tin plate, terne plate and long ternes—Wheeling Steel Corporation.

Drawrite—Deep drawing long ternes—Follansbee Brothers Co.

Duquesne—Special terne coating, blue oil finish—Follansbee Brothers Co.

Excello—Heaviest coating, charcoal finish, bright tin plate—Follansbee Brothers Co.

Follansbee Forge—Tin and terne plates made from hammer-forged open-hearth steel—Follansbee Brothers Co.

Furnace—Coke finish, bright tin plate—Follansbee Brothers Co.

Gilbert—Medium coating, charcoal finish, bright tin plate—Follansbee Brothers Co.

Haynes—Next to lightest coating, charcoal finish, bright tin plate—Follansbee Brothers Co.

Keystone—Copper steel black and coated tin and terne plates—American Sheet & Tin Plate Co.

Lionell Old Style—15-lb. terne coating, bright dry finish—Follansbee Brothers Co.

Lustro—Polished nickel, copper, brass or tin coated sheets—Follansbee Brothers Co.

MF—Terne plate, 32-lb. coating, hand dipped, palm oil finish—American Sheet & Tin Plate Co.

Morton Polished—Tin mill black sheets—American Sheet & Tin Plate Co.

Neville Old Style—20-lb. terne coating, bright dry finish—Follansbee Brothers Co.

Numethodd B—40-lb. coating terne plate; **D**—30-lb. coating terne plate; **F**—20-lb. coating terne plate—American Sheet & Tin Plate Co.

Old Reliable Redipped—30-lb. terne coating, oil finish—Follansbee Brothers Co.

Protection Old Process—25-lb. terne coating, bright dry finish—Follansbee Brothers Co.

Raymond—8-lb. terne coating, oil finish—Follansbee Brothers Co.

Republic—Tin plate—Republic Iron & Steel Co.

Rosedale—Medium coating, charcoal finish, bright tin plate—Follansbee Brothers Co.

Scott's Extra Coated—40-lb. terne coating, palm oil finish—Follansbee Brothers Co.

U. S. Eagle—Terne plate, 40-lb. coating—American Sheet & Tin Plate Co.

Weirton—Coke, charcoal and terne plates—Weirton Steel Co.

Wheeling Steel (in circle with fleur-de-lys)—Tin plate, terne plate and long ternes—Wheeling Steel Corporation.

Wire and Wire Products

3-W—Welding wire—Washburn Wire Co.

Alabama—Light poultry fence and barbed wire—Gulf States Steel Co.

American—Screen wire cloth—Wickwire Spencer Steel Co.

American—Wire, fencing and netting, barbed wire, wire nails, rope, rail bonds, magnet wire, bale ties, wire hoops—American Steel & Wire Co.

American Quality—Cold rolled strip steel and steel springs—American Steel & Wire Co.

Anthony—Wire fence—American Steel & Wire Co.

Armco and **Armco** (on a triangle)—Wire rods, wire, and wire products of ingot iron—American Rolling Mill Co.

Armco—Ingot iron wire rods, wire products and welding wire—Page Steel & Wire Co.

Baker—Barbed wire—American Steel & Wire Co.

Banner—Poultry fence—American Steel & Wire Co.

Besco—Wire and wire nails—British Empire Steel Corporation.

Black Label—Swedish steel music wire for springs—Wickwire Spencer Steel Co.

Blue Center—Wire rope—John A. Roebling's Sons Co.

Cactus—4-point barbed wire—Gulf States Steel Co.

Cherokee—Barbed wire, barbs ½ round—Gulf States Steel Co.

Clinton—Welded fabric and lath, wire screens and netting—Wickwire Spencer Steel Co.

Continental—Nails and barbed wire—Continental Steel Corporation.

Coosa—2-point barbed wire—Gulf States Steel Co.

Copperoid—Copper bearing wire—Youngstown Sheet & Tube Co.

Copperweld—Copper covered wire and wire products—Page Steel & Wire Co.

Cop-r-loy—Copper bearing steel wire, fencing, nails—Wheeling Steel Corporation.

Cortland—Screen wire cloth, painted—Wickwire Brothers.

Defender—Barbed wire, two-round barbs—Keystone Steel & Wire Co.

Disco—Wire and wire nails—British Empire Steel Corporation.

Eagle—Music wire—Washburn Wire Co.

Ellwood—Barbed wire—American Steel & Wire Co.

Excelsior—Poultry and rabbit fence; wire cord and cable—Wickwire Spencer Steel Co.

Glidden—Barbed wire—American Steel & Wire Co.

Gray Strand—Extra strong stiff wire rope—Wickwire Spencer Steel Co.

Gray-Wick—Screen wire cloth, dull finish galvanized and varnished—Wickwire Brothers.

Gulf—Wire, nails, fencing, woven goods—Gulf States Steel Co.

Hawthorne—Barbed wire, two flat barbs—Keystone Steel & Wire Co.

Hen-Chick—Graduated poultry fence—Wickwire Brothers.

IXL—Spring wire—Page Steel & Wire Co.

JAR—(Monogram in circle)—Steel wire, wire rope and wire products—John A. Roebling's Sons Co.

Kelcar—Doubleheaded nails—American Steel Co.

Kelcotters—Cotter pins—American Steel Co.

Kelnails—Doubleheaded nails—American Steel Co.

Kickapoo—Barbed wire, half round barbs—Keystone Steel & Wire Co.

Kokomo—Farm fence—Continental Steel Corporation.

Liberty—Poultry fence; copper bearing steel—Continental Steel Corporation.

Lion—Staple tie farm fence—Page Steel & Wire Co.

Lyman—Barbed wire—American Steel & Wire Co.

Monitor—Wire fence—American Steel & Wire Co.

National—Wire fence—American Steel & Wire Co.

Net-Wick—Poultry fence—Wickwire Brothers.

Norwood—Wire fencing—W. F. Robertson Steel & Iron Co.

Page—Wire, wire products, chain link fence, woven fence—Page Steel & Wire Co.

Paragon—Wire—Washburn Wire Co.

Perfected—Wire strand—American Steel & Wire Co.

Perfection—Door and gate springs—American Steel & Wire Co.

Pioneer—Farm, poultry and lawn fence—Continental Steel Corporation.

Pittsburgh—Wire fence and nails—Pittsburgh Steel Co.

Prairie—Wire fence—American Steel & Wire Co.

Premier—Spring steel wire—American Steel & Wire Co.

Premier Quality—Wire springs—American Steel & Wire Co.

Premier—Screen wire cloth, extra heavy wire, galvanized before weaving—Wickwire Brothers.

Protection—Industrial chain link fence—Page Steel & Wire Co.

Red Brand—Wire fencing of copper bearing steel—Keystone Steel & Wire Co.

Red Devil—Wire fencing—Continental Steel Corporation.

Reliable—Residential chain link fence—Page Steel & Wire Co.

Roebling—Wire rope—John A. Roebling's Sons Co.

Rol-man—Woven screen of manganese steel—Manganese Steel Forge Co.

Royal—Wire fence—American Steel & Wire Co.

Ruthless—Barbed wire, four-round barbs—Keystone Steel & Wire Co.

Security—Woven and chain link fencing—British Empire Steel Corporation.

Southern—Wire fence and barbed wire—Gulf States Steel Co.

Stelco—Wire, fencing, nails—Steel Co. of Canada.

Trulay Strand—Preformed 7-wire galvanized strand—Page Steel & Wire Co.

Union Lock—Wire fence—American Steel & Wire Co.

U. S.—Wire fence—American Steel & Wire Co.

Victory—Fence with staple ties—Continental Steel Corporation.

Waukegan—Barbed wire—American Steel & Wire Co.

Wheeling Steel (in circle with fleur-de-lys)—Wire, fencing, nails—Wheeling Steel Corporation.

Wickwire—Wire, nails, wire cloth, fencing—Wickwire Brothers.

Youngstown—Wire—Youngstown Sheet & Tube Co.

Zinc Insulated—Wire fence—American Steel & Wire Co.

Iron Ore Records Large Increase

Production and Value Up in 1929 and Stocks Were Reduced; Lake Superior District Provided Six-Sevenths of All

IRON ore mined in the United States in 1929, exclusive of that containing 5 per cent or more of manganese, natural, is estimated by the United States Bureau of Mines at 73,283,000 gross tons. This is an increase of 18 per cent on that mined in 1928. Ore shipped from the mines in 1929 is estimated at 75,589,000 gross tons, valued at $197,007,000, an increase over 1928 of 19 per cent in quantity and of 26 per cent in total value. Average value of the ore at mines in 1929 is estimated at $2.61 a gross ton; in 1928 it was $2.46. Stocks of ore at the mines, mainly in Michigan and Minnesota, apparently decreased from 9,190,061 tons in 1928 to 7,102,000 tons in 1929, or 23 per cent.

Lake Superior District

About 86 per cent of the iron ore shipped in 1929 came from the Lake Superior district, in which approximately 63,059,000 gross tons was mined and 65,129,000 tons was shipped, increases of 20 and 21 per cent respectively as compared with 1928. The ore shipped in 1929 was valued at mines at $174,717,000, an increase of 29 per cent. These totals include the ore from mines in southern Wisconsin and ore shipped by rail as well as by water from all mines. They exclude manganiferous ores, amounting to about 1,048,000 gross tons in 1929 and 1,077,705 tons in 1928, which contained 5 per cent or more of manganese in the natural state.

The ore is chiefly hematite. Stocks of iron ore in this district apparently decreased from 7,926,199 gross tons in 1928 to 6,101,000 tons in 1929, or 23 per cent. Stocks at the end of 1929 were about 3,000,000 tons less than the average for the preceding five years. Shipments of iron ore by water from the Lake Superior district in 1929 (including manganiferous iron ores), according to the Lake Superior Iron Ore Association, amounted to 65,204,600 gross tons, an increase of 21 per cent on 1928. Average value of ore at mines in the Lake Superior district in 1929 was $2.68 a ton; in 1928 it was $2.51.

Southeastern States

In the Southeastern States, the second largest iron-ore producing area, including the Birmingham and Chattanooga districts, was mined some 6,794,000 gross tons of ore in 1929, an increase of 2 per cent on 1928. Shipments of ore from mines in these States in 1929 amounted to 6,975,000 gross tons, valued at $13,790,000, increases of 8 and 10 per cent respectively compared with 1928. The ore is mainly hematite; brown ore and magnetite come next in order.

The average value of the ore produced in these States in 1929 was $1.98 a gross ton; in 1928 it was $1.94. Stocks of iron ore at the mines in this group, mainly in the Birmingham district, decreased from 1,019,667 gross tons in 1928 to 839,000 tons in 1929. These stocks are about 300,000 tons less than the average for the preceding five years.

Northeastern States

The Northeastern States—Adirondack district, New York, and Cornwall district, Pennsylvania—in 1929 mined 2,235,000 gross tons of iron ore and shipped 2,290,000 tons, valued at $6,897,000, increases of 12 per cent in quantity mined, 7 per cent in quantity shipped, and 3 per cent in value of shipments compared with 1928. Stocks of ore in this group decreased from 232,030 gross tons in 1928 to 150,000 tons in 1929. These stocks are considerably less than usually carried over at these mines, being about 229,000 tons below the average for the preceding five years. The average value of the ore in these States in 1929 was $3.01 a gross ton; in 1928 it was $3.13. Most of this ore is magnetite.

Western States

Western States which ordinarily produce iron ore, named in order of quantity, are Wyoming, Utah, New Mexico, Colorado, Montana and Washington. Occasionally California, Idaho and Nevada contribute small quantities. All the ore from Wyoming and Colorado and most of that from Utah and New Mexico is used for the manufacture of pig iron. Much of the remainder is used as a flux in smelting copper and the precious metals. It is estimated that the Western States mined and shipped in 1929 approximately 1,195,000 gross tons of iron ore, valued at $1,603,000, an increase on 1928 of 14 per cent in quantity and of 3 per cent in value. The ore comprises hematite, magnetite and brown ore.

Imports and Exports

Imports of iron ore reported for 11 months ended Nov. 30, 1929, amounted to 2,853,279 gross tons, valued at $7,369,823, or $2.58 a ton. Imports for all of 1928 were 2,452,646 gross tons, valued at $5,428,019, or $2.21 a ton. Reported exports of iron ore for 11 months ended Nov. 30, 1929, amounted to 1,302,019 gross tons, valued at $4,762,475, or $3.66 a ton. This compares with exports for the entire year 1928 of 1,282,306 tons, valued at $4,797,881, or $3.74 a ton.

Rolled Zinc

A compendium of information on rolled zinc has been issued by the New Jersey Zinc Co., New York, in the form of a 54-page research bulletin dated October, 1929. The largest outlet for this material is for the manufacture of dry cells. Weather strip, automobile trim, and roofing and siding also absorb important amounts. Zinc foil in thicknesses down to 0.0004 in. is produced in considerable quantities.

Since cold-worked zinc recrystallizes at near to atmospheric temperatures, the ordinary method of stiffening a strip or sheet by cold working is inapplicable. The bulletin describes how different tempers are made available by altering the chemical composition of the sheet, and also illustrates special testing equipment for measuring drawing capacity, "temper" and ductility in bending. A brief discussion of metallography and crystallography is included. Physical and chemical properties are then listed in great detail. Notes on the various fabrication and finishing processes complete the bulletin.

A supplemental pamphlet on "Plating of Rolled Zinc and Zinc Base Die Castings" describes the precautions necessary to get a stain-free flash coat of nickel, upon which ordinary finishes may be plated without further difficulty.

Ford Output Last Year 1,951,092 Vehicles

World production of Ford cars and trucks for 1929 was 1,951,092, an increase of 1,132,358, or 138 per cent, over 1928, according to a statement by the Ford Motor Co. Of the 1929 production, 1,709,945 cars and trucks were produced in United States, 87,796 by the Ford Motor Co. of Canada, Ltd., and 153,351 in other foreign plants.

In excess of $58,000,000 worth of orders for the new-model cars were booked by the Ford Motor Co. dealers throughout the United States by Jan. 4, according to Edsel B. Ford.

Coal and Beehive Coke Production of United States

	December, 1929	November, 1929	December, 1928
Bituminous coal mined, net tons(a)	46,200,000	45,677,000	44,083,000
Anthracite	7,658,000	6,042,000	6,114,000
Beehive coke made(a)	341,200	413,300	408,000
Bituminous coal in calendar year(a)	525,358,000(b)	.....	500,745,000
Anthracite do.	76,640,000(c)	.....	75,348,000
Coal consumed by electric public utilities, net tons(d)	.....	3,791,005(e)	.....

(a)United States Bureau of Mines. (b)Largest since 1926, with 573,367,000 tons. (c)Largest since 1927, with 80,096,000 tons. (d)United States Geological Survey. (e)Compares with 4,047,941 tons in October, with 31 days.

Machinery Markets and News of the Works

Machinery Trend Uncertain

Unfilled Orders Low at End of December, and New Buying Is Picking Up Slowly

THE trend of machine tool buying during the first quarter of the new year is still uncertain. Machine tool builders and dealer representatives are quoting on a large number of inquiries, but whether these will result in an ascending scale of machine tool buying within the next month or two probably depends to a considerable extent on favorable developments in the general business situation.

The National Machine Tool Builders' Association, in its monthly review, states that the "recession in volume of machine tool orders is likely to continue over the next few months unless President Hoover's business conferences influence enough companies to take advantage of reduced activity to revamp their production methods ahead of the next rise."

Although all automobile plants are not completely equipped with the latest types of machine tools, the association takes the view that "the period of rapid expansion is now over for the automobile industry as a whole." In the past several years, the automobile industry has been one of the chief sources of machine tool demand.

Machine tool business in 1929 was the best of any year for which the National Machine Tool Builders' Association has records, but December orders showed a decided drop from the peak of the year, and the unfilled orders at the end of last month were slightly under the total of December, 1928.

Current business is featured by inquiries from railroads centering at Chicago. The Santa Fe is asking for prices on 14 items, some of them heavy tools. The Union Pacific expects to put out a list early in February, and purchases against the Burlington list are expected soon. Other roads which are in the market for several tools each are the Rock Island and Chicago & Alton. The Northern Pacific will buy a large bending roll.

New York

NEW YORK, Jan. 14.—Orders for single tools predominate, and the total volume since the first of the year has not been large. The number of inquiries, however, indicates the interest that manufacturers are taking in new machine tool equipment, but whether this interest will result in an ascending scale of buying within the next month or two will undoubtedly depend to a considerable extent on favorable developments in the general business situation. The latter half of January probably will bring more definite indications of the machine tool trend than did the first half.

Board of Education, Park Avenue and Fifty-ninth Street, New York, has plans for a seven-story technical high school at Fort Greene Place and DeKalb Avenue, Brooklyn, including complete industrial and mechanical arts divisions, to cost more than $5,000,000 with equipment. Walter C. Martin is architect for board.

Kent Garage Operating Co., 350 Madison Avenue, New York, has acquired property at Seventh Avenue and Fifty-third Street, 100 x 175 ft., for new multi-story service, repair and garage building, to cost more than $500,000 with equipment. Jardine, Hill & Murdock, 347 Madison Avenue, are architects.

Texas Co., 17 Battery Place, New York, has plans for oil storage and distributing plant at Ossining, N. Y., to cost more than $175,000 with equipment.

Western Electric Co., 195 Broadway, New York, is planning an expansion and improvement program to cost about $55,000,000, including work now under way. Projects will comprise additions in plant at Hawthorne, Ill., Kearny, N. J., and Point Breeze, Baltimore.

Central Hudson Gas & Electric Co., Poughkeepsie, N. Y., is arranging for increase in capital from 500,000 shares of stock to $10,000,000 and 1,500,000 shares of stock, no par value, part of proceeds to be used for expansion in plants and system.

Horace Ginsberg, 205 East Forty-second Street, New York, architect, has plans for a five-story automobile service, repair and garage building, to cost over $130,000 with equipment.

Department of Water Supply, Gas and Electricity, Municipal Building, New York, will soon take bids on general contract for one-story repair and mechanical shop, with service and garage facilities, at St. George, S. I., to cost about $75,000 with equipment. Sibley & Fetherstone, 205 East Forty-second Street, are architects.

Brooklyn Borough Gas Co., 1721 Sheepshead Bay Road, Brooklyn, has asked bids on general contract for an equipment storage and distributing plant, with mechanical shop, automobile service and garage building, to cost about $275,000 with equipment. Bloch & Hesse, 18 East Forty-first Street, New York, are architects; C. E. Smith, 116 West Thirty-ninth Street, is engineer.

In connection with an expansion and improvement program to cost $76,848,053, New York Edison Co., 4 Irving Place, New York, will expend $20,581,095 for additions in steam-operated electric generating stations, covering plants operated under such name to an amount of $4,572,270, and affiliated organizations, United Electric Light & Power Co., $8,667,825, and Brooklyn Edison Co., $7,341,000, including buildings and equipment.

Farber & Kalkin, 1746 Pitkin Avenue, Brooklyn, architects, have plans for a two-story automobile service, repair and garage building, to cost about $150,000 with equipment.

RCA Radiotron Co., Inc., has been organized as a joint subsidiary of Radio Corporation of America, Inc., Woolworth Building, New York; General Electric Co., Schenectady, N. Y.; and Westinghouse Electric & Mfg. Co., East Pittsburgh, to manufacture radio tubes and equipment. Company will take over production heretofore carried out by last two noted organizations, concentrating under one management. Expansion in output will be arranged. T. W. Trech, vice-president, General Electric Co., will be president of new company.

Driver-Harris Co., Middlesex Street, Harrison, N. J., manufacturer of wire products, is considering one and two-story additions to plant, to cost about $300,000 with equipment. J. A. Finegan, 776 Broad Street, Newark, N. J., is architect.

Board of Education, City Hall, Newark, is planning early call for bids on general contract for three-story industrial art school, 100 x 120 ft., to cost about $900,000 with equipment. Guilbert & Betelle, 24 Branford Place, are architects.

Chapman-Chevrolet Co., Grantwood, N. J., local representative for Chevrolet automobile, has purchased property, 95 x 169 ft., at Fort Lee, N. J., as site for service, repair and sales building, to cost about $100,000 with equipment.

New England

BOSTON, Jan. 14.—Business in new machine tools has improved slightly, but is spotty and by no means active. The largest single order reported was for two 16-in. and two 13-in. lathes, placed with a Massachusetts company.

The advancing prices for new tools are creating a better demand for used tools, but dealers are still handicapped by a lack of equipment required. New England makers of small tools did a record business in 1929. January sales to date are about equal to those for the corresponding period last year.

Portland Terminal Co., Portland, Me., will build a coal pocket for which materials handling equipment will be required.

Simonsville Mfg. Co., Waterbury, Conn., has started work on a one-story addition for which miscellaneous electrical and mechanical equipment will be required.

Indian Motocycle Co., Springfield, Mass., is speeding up production. Orders on hand are greater than a year ago, and the company, recently financed, is considering adding to its mechanical equipment.

Thompson Products Co., Inc., Hartford, Conn., has received orders from International Harvester Co. for its first six months' supply of valves; 200,000 valves from Chrysler Corporation; 170,000 from Buick; $200,000 worth of drag links from Ford Motor Car Co.; 140,000 valves and 43,000 spring bolts from another concern and 156,000 valves and 26,000 spring bolts from Oakland Motor Co. Company is considering purchase of additional machine tools.

Nebes Machinery & Supply Co., Lowell, Mass., has purchased former local mill of Lowell Hosiery Co., with 15,000 sq. ft. of floor space, for expansion in storage and distribution.

Shell Eastern Petroleum Products, Inc., 122 East Forty-second Street, New York, will carry out an expansion at oil storage and distributing plant at New Haven, Conn., including new shops, automobile service, repair and garage building and other structures, to cost about $100,000 with equipment.

Multibestos Co., South Street, Walpole, Mass., manufacturer of brake lining, etc., has revised plans for two-story addition, 40 x 80 ft., for mechanical drying and other service, to cost about $45,000 with equipment. Lockwood Greene Engineers, Inc., 24 Federal Street, Boston, is architect and engineer.

CeCo Mfg. Co., Providence, R. I., manufacturer of radio tubes and equipment, will carry out expansion program, to cost about $200,000 including machinery. Company will occupy a new four-story building adjoining and will use one floor for experimental and research work, with installation of precision testing equipment, etc. Ernest Kauer is president.

Englander Spring Bed Co., 1604 Hyde Park Avenue, Hyde Park, Boston, manufacturer of metal bedsteads, springs, etc., with main plant at Brooklyn, has asked bids on general contract for a three-story factory branch and distributing plant, 40 x 60 ft., to cost about $60,000 with equipment. J. W. Pearson & Co., 25 Huntington Avenue, Boston, are architects.

Southern New England Ice Co., Hartford, Conn., has plans for a new local ice-manufacturing plant, to cost $140,000 with machinery. A similar plant will be built at New London, Conn., to cost about $90,000 with equipment. R. B. Engineering Corporation, 11 East Forty-second Street, New York, is engineer.

The Crane Market

NEW inquiry for overhead cranes has been rather limited since the beginning of the year, but buyers have been asking for estimates on the cost of cranes of various capacities and some substantial formal inquiry is expected to develop. The Baltimore & Ohio Railroad has three gantry cranes pending, and the Erie Railroad is reported to have closed on a gantry crane for Hornell, N. Y. Locomotive crane inquiry is small, but sellers point out that the railroads have not yet made their appropriations for 1930 and it is too early in the year for much business from contractors. The Maine Central Railroad Co., Portland, Me., is inquiring for a 25-ton locomotive crane with pile-driver attachment and Stevens & Wood, Inc., New York, is inquiring for a 25-ton used locomotive crane for use in the South.

Philadelphia

PHILADELPHIA, Jan. 13.—Lit Brothers, Eighth and Market Streets, Philadelphia, will soon take bids on general contract for one-story and basement power plant for department store service, to cost about $200,000 with equipment. Simon & Simon, Fidelity Philadelphia Building, are architects.

Electric Service Supplies Co., Seventeenth and Cambria Streets, Philadelphia, manufacturer of electrical equipment and supplies, has revised plans for six-story factory addition, to cost over $75,000 with equipment. Conrad F. Neff, Twelfth and Locust Streets, is architect.

Steubling-Cowan Truck Co., Holyoke, Mass., manufacturer of motor-operated factory and mill trucks, a subsidiary of Yale & Towne Mfg. Co., Stamford, Conn., will remove plant to Philadelphia, where production will be largely concentrated in future. Theodore T. Ludlum, manager, and Philip E. Ladd, assistant manager, will continue in same positions.

General Outdoor Advertising Co., Inc., Eighteenth and Noble Streets, Philadelphia, has awarded general contract to Barclay White & Co., 22 North Thirty-sixth Street, for one-story mechanical and operating shop, automobile service and garage building, and offices, 87 x 425 ft., to cost over $100,000 with equipment. Ballinger Co., Twelfth and Chestnut Streets, is architect and engineer.

F. & E. Aubel, 2503 Germantown Avenue, Philadelphia, operating a general iron works, are contemplating new plant at Cheltenham, Pa., to cost about $65,000 with equipment.

Riverside Metal Co., Riverside, N. J., manufacturer of fine sheet wire and rod specialties, bronze products, etc., has begun construction of addition, totaling about 60,000 sq. ft., to cost about $300,000 with equipment. Company is affiliated with Keystone Watch Case Co., with factory on adjoining site.

State Board of Education, State House, Trenton, N. J., will receive bids on general contract until Jan. 28 for construction of trade school at Manual Training and Industrial School for Colored Youths, Bordentown, N. J., to cost over $100,000 with equipment. Plans at office of Guilbert & Betelle, 24 Branford Place, Newark, architects.

Captain Anton Heinen, Toms River, N. J., formerly connected with Zeppelin Co., Berlin, Germany, is at head of project to establish and operate an aircraft manufacturing plant at Atlantic City, N. J., where 20-acre tract has been selected. Works will specialize in production of new type of dirigible for passenger and freight service, including parts and assembling departments. A company will be organized to carry out project.

Board of Education, Chambersburg, Pa., is considering installation of manual training equipment in new two-story senior high school to cost $300,000, for which bids will be asked on general contract early in February. Lawrie & Green, 821 North Third Street, Harrisburg, Pa., are architects.

Pennsylvania Power & Light Co., Allentown, Pa., plans expansion and improvements in power facilities and transmission lines at Harrisburg, Pa., and vicinity, to cost about $1,750,000 with equipment.

South Atlantic

BALTIMORE, Jan. 13.—General Motors Corporation, Detroit, through subsidiary organization, Argonaut Realty Corporation, has plans for one and two-story service, repair and sales building at Baltimore, to cost about $100,000 with equipment. Albert Kahn, Inc., Marquette Building, Detroit, is architect and engineer.

Julian P. Friez, Co. Division of Consolidated Instrument Corporation, Baltimore Street and Central Avenue, Baltimore, has revised plans for three-story addition, to cost about $75,000 with equipment. E. H. Glidden, Jr., American Building, is architect. L. L. Friez is in charge. Headquarters of parent company are at 395 East Forty-seventh Street, New York.

Maryland Light & Power Co. has been formed by officials of Empire Public Service Corporation, 1600 Arch Street, Philadelphia, to take over and consolidate group of electric light and power properties in Maryland, including Maryland East Coast Utilities, Inc., and Betterton Ice & Electric Co., Betterton; Ceciliton Electric Light & Power Co., Ceciliton, and ten other utilities in that district, with combined valuation of $1,800,000. New owner plans expansion and transmission lines for interchange of service.

McArthur-Wood Chevrolet Co., Gaffney, S. C., local representative for Chevrolet automobile, has plans for three-story service, repair and sales building, 90 x 100 ft., to cost about $100,000 with equipment.

Board of Works, Baltimore, has plans for electrically-operated pumping plant for municipal waterworks at Ashburton, to cost about $100,000 with equipment. Warren Viessman, Municipal Building, is electrical engineer.

Potomac Electric Power Co., Fourteenth and G Streets, Washington, has plans by Stone & Webster Engineering Corporation, 49 Federal Street, Boston, for two-story addition to steam-operated electric generating plant at Benning, to cost about $2,500,000 with equipment. Extensions will be made in transmission lines. Company also has plans by A. B. Heaton, 1211 Connecticut Avenue, N. W., architect, for a five-story equipment storage and distributing plant, with mechanical and electrical shops, including service and garage building for com-

pany automobiles, to cost about $250,000 with equipment.

In connection with expansion and improvement program to cost $30,000,000, Ford Motor Co., Detroit, is considering extensions and betterments in assembling plant at Norfolk, Va., to cost more than $1,000,000 with equipment.

Charlotte Coca-Cola Bottling Co., 211 North Graham Street, Charlotte, N. C., has plans for two-story and basement bottling plant, 110 x 185 ft., at Summit Avenue and Morehead Street, including automatic bottling machinery, conveying equipment, etc., with one-story machine shop and boiler plant adjoining, to cost about $100,000 with equipment. M. R. Marsh, Builders' Building, is architect.

Washington Airport, Inc., Washington, has awarded contract to Bahen & Wright Co., Washington, for erection of a hangar, 100 x 120 ft., administration building, passenger station, machine shop and other servicing facilities, to cost $85,000.

Pittsburgh

PITTSBURGH, Jan. 13.—Machine tool inquiry improved last week, and dealers are agreed that business is normal for this time of year. The full first quarter list of the Westinghouse Electric & Mfg. Co., East Pittsburgh, is now out and indicates definitely that this company does not plan curtailment of equipment purchases at this time. Miscellaneous inquiries are also coming from other industrial companies in the district, but the railroads have failed to come into the market as yet. The Baltimore & Ohio has a few tools pending, on which inquiry was made some time ago.

Early estimates of 1930 business are generally favorable, so far as the machine tool business is concerned. The fact that the first quarter of the year promises to be quiet from a manufacturing standpoint is expected to improve equipment purchases. Industrial expansion in this district is unchecked. The American Austin Motor Co. has bought tools for its automobile assembly plant at Butler, Pa., which is expected to get into operation about April 1, and further purchases are expected to be made by this company. The company's principal buying office is at Detroit.

Wuhco Battery Co., Swissvale, Pa., has plans for an addition, totaling about 50,000 sq. ft., to manufacture electric storage batteries, to cost over $150,000 with equipment. Company is a subsidiary of Electric Auto Lite Co., Toledo, Ohio.

National Electric Products Co., Fourteenth Street, Ambridge, Pa., has plans for new one-story plant, 125 x 175 ft., to cost over $100,000 with equipment. Company engineering department is in charge.

Pittsburgh Plate Glass Co., Frick Building, Pittsburgh, is considering extensions and improvements in sheet glass plant at Norwood, W. Va., to cost over $200,000 with equipment.

Armstrong Electric & Mfg. Co., Seventh Avenue, Huntington, W. Va., manufacturer of electric ranges and other domestic electric products, is planning expansion, including installation of additional chromium and other plating equipment, to cost more than $30,000.

Mackintosh-Hemphill Co., Twelfth and Etna Streets, Pittsburgh, manufacturer of rolling mill equipment and other heavy machinery, is planning extensions and improvements in branch plant at Midland, Pa., including installation of an electric furnace and other equipment, to cost about $85,000.

Superior Paper Products Co., Carnegie, Pa., will soon take bids on general contract for one-story addition, to cost over $100,000 with equipment. Braziell & Anderson, 309 Fourth Avenue, Pittsburgh, are architects.

Detroit

DETROIT, Jan. 13.—Grand Rapids Store Equipment Co., 1545 Madison Street, S. E., Grand Rapids, Mich., manufacturer of metal fixtures, showcases, etc., is contemplating an addition to plant, to cost over $50,000 with equipment.

Clark Tructractor Co., Springfield Place, Battle Creek, Mich., manufacturer of motor-driven factory and mill trucks, tractors, etc., is planning one-story addition, to cost about $70,000 with equipment. H. W. Burnside is one of heads of company, in charge.

Brown-McLaren Mfg. Co., 5853 West Fort Street, Detroit, manufacturer of screens, etc., has awarded general contract to Walbridge Aldinger Co., Buhl Building, for a one-story machine shop, to cost about $40,000 with equipment

Airport Board, City Hall, Port Huron, Mich., is planning establishment of municipal airport, including hangars, repair shop and other units, to cost about $80,000 with equipment. L. R. Whitmore, Court House, is city engineer.

Evaco Industries, Inc., 1329 East Vernor Street, Detroit, manufacturer of chromium plated products, has taken over property on Orchard Lake Avenue, Pontiac, for new branch plating works. E. V. Allen, formerly connected with General Chromium Co., Detroit, is president.

Michigan Gear & Engineering Co., 19 West Woodbridge Street, Detroit, is considering one-story addition to cost about $30,000 with equipment.

Thompson-Gibb Welding Machines Co., Bay City, has acquired an adjoining 3½-acre tract for expansion.

River Raisin Paper Co., Monroe, Mich., is planning for expansion and improvements to cost about $200,000, including installation of additional machinery.

Pere Marquette Railroad Co., Fort Street Union Depot, Detroit, is considering plans for new car repair shop at Grand Rapids, with adjoining one-story structure for equipment and material storage and distribution, to cost about $70,000 with equipment. H. A. Cassil is chief engineer.

Jackson Machine Tool Co., 3508 St. Aubin Street, Detroit, is planning erection of one-story plant on site recently acquired on LaSalle Boulevard, to cost more than $50,000 with equipment.

Village Council, St. Clair Shores, Mich., Charles Dederich, village clerk, will receive bids until Jan. 21 for electrically-operated pumping machinery for sewage system, entire project to cost over $500,000. Plans and specifications at office of Walter J. Lehner, Mount Clemens, village engineer.

G. W. Hubbard Hardware Co., 314 South Saginaw Street, Flint, will erect a top addition to storage and distributing plant, to cost about $60,000 with equipment. E. Byers, Citizens Bank Building, is architect.

Silent Automatic Corporation, manufacturer of fuel oil burners, has moved from 255 Meldrum Avenue, Detroit, to its new plant at 12061 East Jefferson Avenue. Walter F. Tant is president.

Rex Foundry Co., Detroit, recently organized by H. Petrequin and W. Schoewe to manufacture match plates and general brass and aluminum castings, has started operations at 3562 Palmer Street.

Cleveland

CLEVELAND, Jan. 13.—The machine tool market continues dull although inquiry showed a little gain the past week. While the trade regards the outlook for the year as promising, not much improvement in orders is expected before March. Buyers are cautious in making purchases and some who are figuring on a number of machines are placing a single tool and deferring purchase of the remainder. Business is coming from diversified sources outside of the automotive industry, which is doing virtually no buying at present. Production schedules of some local machine tool plants have been curtailed considerably and these have resumed operations after their inventories with reduced working forces.

Chandler Products Corporation, Cleveland, has been formed with a capital stock of $250,000 and has acquired 3-acre site on Chardon Road, adjoining Nickel Plate Railroad, on which it will erect a plant to manufacture cap screws, studs and allied products, at a cost of about $200,000, including equipment. Men at head of company were formerly affiliated with Chandler Motor Car Co. Fred C. Chandler, Jr., is president; C. E. Neeham, vice-president; I. Grossman, secretary. Plant was designed by Ernest McGeorge, Inc., 3030 Euclid Avenue, and will be erected by Sam W. Emerson Co.

Mid-West Forge Co., 17301 St. Clair Avenue, Cleveland, has asked bids on general contract for one-story addition, to cost over $45,000 with equipment. Kalsch & Hoefler, 4500 Euclid Avenue, are architects. R. I. Gale is president.

Champion Spark Plug Co., Toledo, Ohio, is arranging for increase in capacity of about 25 per cent, for output of more than 5,200,000 spark plug units per month.

Atlas Steel & Supply Co., 4401 Trumbull Avenue, Cleveland, has plans for three-story addition to storage and distributing plant, to cost more than $65,000 with equipment. W. J. Wefel, 15716 Euclid Avenue, is architect.

General Electric Co., Schenectady, N. Y., is planning removal of Edison Lamp Works plant from Harrison, N. J., to Cleveland, where headquarters will be maintained in future.

Board of Education, Independence, Ohio, has asked bids on general contract for new two-story high school, to include a manual training department, to cost $160,000. Fulton & Taylor, 8120 Euclid Avenue, are architects.

Franklin Oil & Gas Co., Bedford, Ohio, is considering one-story oil works, to cost more than $85,000 with equipment. G. W. Shaw is head.

Firestone Tire & Rubber Co., Akron, Ohio, is planning early call for bids on general contract for three-story factory branch, service and distributing plant at Toledo, Ohio, to cost about $200,000 with equipment. Lockwood Greene Engineers, Inc., Hanna Building, Cleveland, is architect and engineer.

Board of Works, Conneaut, Ohio, is considering installation of electrically-

operated pumping machinery in connection with extensions and betterments in municipal waterworks, to cost about $75,000.

Bender Body Co., 6409 Barberton Road, Cleveland, manufacturer of automobile bodies, has asked bids on general contract for two-story addition for storage and distribution, to cost about $40,000 with equipment.

Youngstown Steel Sales, Inc., Youngstown, will represent Falk Corporation, Milwaukee, whose products include parallel shaft and right angle speed reducers, herringbone gears for all purposes, special gear drives of any size and flexible shaft couplings.

Cincinnati

CINCINNATI, Jan. 13.—Although manufacturers received a few scattered orders for standard tools the past week, general demand is quiet. Production, however, continues at the same level that has prevailed for the past eight months and is cutting down the large amount of unfilled orders. Inquiry for all types of machine tools has improved and a number of contracts are pending which are expected to be closed soon.

Duriron Co., Inc., Dayton, Ohio, manufacturer of alloy castings, etc., has plans by Geyer & Neuffer, Ludlow Arcade, architects, for addition to laboratory and experimental plant, including foundry, machine shop, etc., to cost over $100,000 with equipment.

Memphis Power & Light Co., Memphis, Tenn., is planning expansion and improvements to cost $2,715,000, of which about $825,000 will be used for additions to power plants, and about $600,000 for transmission line extensions. About $590,000 will be expended for gas division, including increased generating and distributing facilities.

Chattanooga Stove & Foundry Co., Chattanooga, Tenn., recently organized by J. E. Abshire, Chattanooga, and associates, has plans for new works in East Lake district, to cost about $175,000 with equipment. Initial unit is expected to be ready for service during summer. Mr. Abshire will be president of new company.

D. L. Auld Co., Sixth Avenue, Columbus, Ohio, manufacturer of automobile hardware products, name plates, etc., is considering one-story addition, to cost more than $40,000 with equipment.

George Dempster, city manager, City Hall, Knoxville, Tenn., has plans for hangar at McGhee-Tyson municipal airport, with repair and reconditioning facilities, to cost about $30,000 with equipment. Harry Wight, City Hall, is city engineer.

Gulf Refining Co., Frick Annex, Pittsburgh, is contemplating an oil storage and distributing plant at Franklin, Tenn., to cost over $80,000 with equipment.

Pittsburgh Plate Glass Co., Frick Building, Pittsburgh, has plans for two-story and basement factory branch and distributing plant at Nashville, Tenn., 150 x 160 ft., to cost more than $100,000 with equipment. R. W. Bratton, 220 Union Street, Nashville, is in charge.

Board of Directors, Eastern State Normal School and Teachers' College, Morehead, Ky., has authorized installation of manual training department in three-story school unit, 65 x 110 ft., to cost about $180,000, for which general contract has been let to Key Langston Construction Co., Murray, Ky. Joseph & Joseph, Breslin Building, Louisville, are architects.

Moise Steel Co. of Cincinnati, Ohio, has been incorporated and is operating a sheet steel warehouse at Linwood Avenue and Pennsylvania Railroad. It is a subsidiary of Moise Steel Co., Milwaukee.

Tennessee Stove Works, Chattanooga, Tenn., has plans for an additional enameling plant, one story, to cost $200,000. It is expected to be ready for operation by middle of summer.

Chicago

CHICAGO, Jan. 13.—The foremost development in the market the past week was the active entry by the railroads. The Santa Fe is making requests for prices on a number of items on a large list which will soon come before the trade. The Rock Island will buy a 36-in. lathe, a 36-in. drill and a hydraulic bushing press. The Chicago & Alton will purchase a journal turning machine, a bushing press, a riveter, a stay bolt cutter and a 3-ton electric hoist. The Milwaukee Road is taking figures on an 18-in. x 3-in. grinder and the Northern Pacific will buy a large bending roll. Purchases by the Burlington are near at hand and the Union Pacific expects to send out a list early in February. A Chicago steel mill will buy a 13-in. x 13-in. hack saw, a beam end facer and a hot saw.

Taken as a whole this market is steady and is gaining rapidly from the viewpoint of inquiries. Deliveries in many lines are improving slowly.

Santa Fe is requesting prices on the following items:

One 6-ft. radial drill.
Two 90-in. journal turning lathes.
One 36-in. x 14-ft. lathe.
One axle lathe.
One car-wheel borer.
Two 36-in. shapers.
One bench grinder.
One 24-in. x 3-in. floor grinder.
One 24-in. x 10-ft. lathe.
One flue sheet drilling machine.
One 250-lb. power hammer.
One high-speed cut off saw.

Vail Mfg. Co., 1752 East Seventy-fifth Street, Chicago, manufacturer of thumb tacks, paper clips and other metal specialties, has plans for a three-story addition, to cost over $70,000 with equipment. L. E. Russell, 140 South Dearborn Street, is architect.

Paul Oehmig & Co., 1950 West Ohio Street, Chicago, manufacturer of mixing and grinding machinery, have purchased factory at California Avenue and Flournoy Street, for expansion. Company has recently acquired paint and ink roller division of American Oven & Machine Co., 615 South California Avenue, and is consolidating with regular lines.

General Refractories Co., Joliet, Ill., is planning to rebuild part of machine shop at local plant, destroyed by fire Jan. 2.

Container Corporation of America, Inc., 111 West Washington Street, Chicago, manufacturer of corrugated and other containers, cases, etc., has purchased Sefton Mfg. Corporation, 59 East Madison Street, manufacturer of kindred products, and its affiliated organization, Dixon Board Mills, Inc., manufacturer of paperboard and boxboard products. Purchasing company will consolidate with organization, operating acquired interests as divisions of company, under present names. All mills will be continued in operation at Brooklyn, N. Y., Anderson and Carthage, Ind., and Chicago, and expansion and betterment program carried out.

Pence Automobile Co., 800 Hennepin Avenue, Minneapolis, Minn., is considering construction of one-story storage and distributing plant, with service and repair department, to cost about $100,000 with equipment.

Otter Tail Power Co., Fergus Falls, Minn., is considering construction of new steam-operated electric power plant near Appleton, Minn. to cost about $400,000, including transmission lines. Work is to begin in spring.

Pueblo Lime Co., 325 East Eighth Street, Pueblo, Colo., W. N. Thomas, head, is considering expansion to double present capacity, to cost over $50,000 with equipment.

Sioux City Gas & Electric Co., Sioux City, Iowa, is disposing of a bond issue of $1,000,000, part of proceeds to be used for extensions and improvements in plant and system.

J. E. Decker & Sons Packing Co., 320 Fifteenth Street, N. W., Mason City, Iowa, meat packer, has plans for new five-story plant, 135 x 203 ft., with elevating, conveying and other mechanical-handling equipment, cold storage equipment, etc., to cost $350,000. H. P. Henschien, 1637 Prairie Avenue, Chicago, is architect and engineer.

City Council, Rochester, Minn., has surveys and estimates of cost for a municipal hydroelectric generating plant at Oronoco, Minn., and will vote on proposition at early date. Power Engineering Co., Metropolitan Life Building, Minneapolis, is engineer. A. F. Wright is city clerk.

Buffalo

BUFFALO, Jan. 13.—Jamestown Screen & Mfg. Co., Jamestown, N. Y., manufacturer of screens and kindred wire goods, a subsidiary of A. C. Norquist Co., has plans for a four-story addition, to cost about $60,000 with equipment.

Charles F. Stanton, 104 Strathmore Drive, Syracuse, N. Y., and associates have organized Apex Mfg. Co., with capital of $100,000, and plan early operation of local factory to manufacture ventilators and kindred products. John W. Howe, 109 Columbia Avenue, is also interested in new organization.

Cary Safe Co., 1200 Niagara Street, Buffalo, has disposed of its Canadian interests to Dominion Safe & Vault Co., Niagara Falls, Ont., which recently took over Fetherstone Safe Co., Hamilton Ont., and has sold rights for manufacture of Cary safes and vaults in Canada to Dominion company, which will operate a plant at Niagara Falls, Ont.

Oneida Community, Ltd., Sherrill, N. Y., manufacturer of plated ware, animal traps, etc., is planning to rebuild local forge shop recently destroyed by fire. Headquarters of company are at Oneida, N. Y.

Perfect Tank & Seat Co., Inc., Syracuse, N. Y., has been formed with a capital of $75,000 to take over and expand company of same name, with local plant at 1425 Erie Boulevard East, manufacturer of metal tanks, etc. Charles A. Holloway, 2245 Cleveland Avenue, Portsmouth, Ohio, is interested in new organization.

Board of Education, Camden, N. Y., is considering installation of manual training equipment in addition to high school, to cost about $200,000, for which plans will be drawn by E. T. Hallenback, 212

Harrison Street, Syracuse, N. Y., architect.

Snyder-Rochester Corporation, Rochester, N. Y., has been formed by Moe Snyder, 556 Harvard Street, and associates, to operate a local plant for manufacture of iron and steel specialties, copper and other metal goods.

Falk Corporation, Milwaukee, has arranged with Root, Neal & Co., Buffalo, to sell Falk products in Buffalo district. This new selling outlet will handle Falk herringbone parallel shaft speed reducers, right angle reducers, and Falk flexible couplings.

St. Louis

ST. LOUIS, Jan. 13.—Skinner Brothers Mfg. Co., 98 South Vandeventer Avenue, St. Louis, manufacturer of unit heaters, has plans for two-story addition, to cost about $40,000 with equipment. Aegerter & Bailey, Railway Exchange Building, are architects.

Universal Match Co., Ferguson, Mo., plans rebuilding part of plant destroyed by fire Jan. 6.

Kinloch Brass Casting Co., 2356 Palm Street, St. Louis, has asked bids on general contract for one and two-story machine shop, 40 x 105 ft., to cost about $45,000 with equipment. Philip Colonius is in charge.

Fred Dold Co., 411 East Twenty-first Street, Wichita, Kan., meat packer, will build new packing plant, to cost about $250,000 with equipment, including elevating, conveying and other mechanical-handling apparatus. H. P. Henschien, 1637 Prairie Avenue, Chicago, is architect and engineer.

Moth Aircraft Co., Lowell, Mass., manufacturer of airplanes and parts, affiliated with Curtiss-Wright Corporation, Buffalo, is arranging for early removal of plant to St. Louis, where production will be consolidated at plant of parent company used for manufacture of Robin airplanes. It is purposed to expand St. Louis plant to accommodate increase and to have Moth aircraft division ready for service in about 60 days. Parent company contemplates using Lowell plant for production of aircraft instruments and other airplane accessories, now being carried out at another location. Milton M. Warren heads Moth organization.

Public Service Co. of Oklahoma, Tulsa, is considering new steam-operated electric generating plant near Hulbert, Okla., to cost about $100,000 with equipment. Extensions will be made in transmission lines in that district.

Eagle Elevator Co., Board of Trade Building, Kansas City, Mo., has begun construction of new grain elevator in East Bottoms district, for capacity of 1,000,000 bu., to cost more than $400,000 with machinery.

Greenlease-Leis Motor Co., Twenty-eighth and Farnam Streets, Omaha, Neb., has engaged G. L. Fisher, First National Bank Building, architect, to prepare plans for service, repair and sales building, to cost about $200,000 with equipment.

White Oak Refining Co., Hunt Building, Tulsa, Okla., is contemplating new refinery, to cost more than $300,000 with equipment.

City Council, Unionville, Mo., has plans for extensions and improvements in municipal electric light and power plant, including installation of additional equipment, to cost over $40,000. W. B. Rollins & Co., Railway Exchange Building, Kansas City, Mo., are engineers.

Missouri-Kansas-Texas Railroad is inquiring for a No. 2 motor-driven mud ring and flue sheet drill and two turret lathes for shops at Parsons, Kan.

Madison Packing Co., Madison, Ill., has plans for two plants, totaling 8750 sq. ft., to cost about $50,000.

Valley Dolomite Co., B. P. Williams, president, St. Louis, operating kilns at Granite City, Ill., has purchased a quarry site near Bonne Terre, Mo., and has awarded contract to Columbia Quarries Co., St. Louis, for erection of a plant to cost $75,000.

Gulf States

BIRMINGHAM, Jan. 13.—American Cast Iron Pipe Co., Birmingham, has awarded general contract to Southern Steel Works, Inc., 908 Lanier Avenue, for one-story foundry, to cost about $25,000 with equipment.

Crystal Carbonic Laboratory, Inc., Atlanta, Ga., manufacturer of compressed carbonic gas for beverages, etc., a subsidiary of Coca-Cola Co., Atlanta, has acquired property at North Dallas, Tex., as site for new plant for which plans will be prepared at once, to cost about $100,000 with equipment. William C. Cochran is vice-president and general manager.

Prall-Huff Co., 1010 Monroe Street, Fort Worth, Tex., manufacturer and distributer of soda fountain equipment and supplies, is planning one-story addition, to cost over $60,000 with equipment. New unit will be used in part for storage and distribution.

American Smelting & Refining Co., El Paso, Tex., is planning expansion and improvements at local plant, including installation of new reverberatory furnace, crushing plant and other equipment, to cost more than $100,000. Headquarters are at 120 Broadway, New York.

Board of Education, Amarillo, Tex., will have plans drawn soon for manual training unit at Buchanan school, to cost about $75,000 with equipment.

Texas & Pacific Railway Co., Dallas, Tex., has awarded general contract to Robert E. McKee Construction Co., El Paso, Tex., for new engine house and shops at Big Spring, Tex., including machine shop, four car repair shops, power house, oil house, and other units, to cost more than $250,000 with equipment. E. F. Mitchell, Dallas, is chief engineer.

Agricola Furnace Co., Gadsden, Ala., manufacturer of domestic furnaces and heaters, has begun an expansion program, including one-story addition to foundry, extension to molding room of about 18,000 sq. ft., and addition to sheet metal division, to cost more than $70,000 with equipment.

City Council, River Junction, Fla., is arranging a fund of about $250,000 for establishment of municipal airport, including hangars, repair shops, oil storage and other units, for which plans will soon be drawn.

Alamo Iron Works, 130 Santa Clara Street, San Antonio, Tex., has plans for one-story and basement storage and distributing plant, 65 x 100 ft., at Corpus Christi, Tex., to cost about $40,000 with equipment. Hardy & Curran, Nixon Building, Corpus Christi, are architects.

Negotiations are under way by Chicago Bridge & Iron Co. for purchase of Birmingham plant of Reeves Brothers Co., tank and structural plate fabricator, Alliance, Ohio.

Milwaukee

MILWAUKEE, Jan. 13.—Machine tool manufacturers and dealers report orders and inquiries only slightly below those for the corresponding period last year and ahead of those in the early part of last month. Demand is mostly for standard machines from small shops, but there is considerable inquiry for special equipment from a wide range of industries. While automobile manufacture is picking up slowly, agricultural implement and tractor builders are unusually busy.

Unit Corporation of America, Milwaukee, manufacturer of tractor and motor truck transmissions, contemplates building a boiler house addition to its plant at West Allis, to cost about $40,000.

Hill-Hubbell Co., 105 West Adams Street, Chicago, has let general contract to Wisconsin Bridge & Iron Co., Milwaukee, for a new two story factory, 190 x 260 ft., to cost about $85,000 without equipment, adjoining plant of A. O. Smith Corporation, to coat tubes and pipe made by latter company.

Municipal Foundries, Inc., 652 Seventy-seventh Avenue, West Allis, Wis., has let contract for a factory, 50 x 50 ft.

School Board, Milwaukee, has plans for a four-story addition to Girls' Trade and Technical School, to cost about $250,000. G. E. Wiley is school board architect.

Webster Mfg. Co., Superior, Wis., manufacturer of office chairs, contemplates construction of a new factory, to cost about $50,000 without equipment. J. O. Bach, 1111 Tower Avenue, is architect.

County Board of Supervisors, Waukesha, Wis., has appointed Richard Kaupert, 290 Third Street, Milwaukee, consulting engineer, to design a new power plant to cost about $50,000 for County institutions. William Koehler is County clerk.

Aylward Sons Co., 701 Main Street, Neenah, Wis., is contemplating an addition to its foundry in spring. Plans have not yet been completed. William Aylward is secretary and manager.

Fort Howard Paper Co., Green Bay, Wis., has awarded contract to Selmer Co., Green Bay, for a warehouse and paper converter building, three stories, 100 x 200 ft., to cost about $125,000 complete.

Indiana

INDIANAPOLIS, Jan. 13.—Capehart Automatic Phonograph Co., East Pontiac Street, Fort Wayne, has begun foundations for a one-story addition, to cost about $30,000 with equipment. Charles R. Weatherhogg, 250 West Wayne Street, is architect.

National Automatic Tool Co., Seventh Street, Richmond, has plans for an addition and improvements in present factory, to cost more than $35,000 with equipment. J. W. Mueller, 42 South Ninth Street, is architect and engineer.

Corman Aircraft Corporation, Connersville, affiliated with Auburn Automobile Co., Auburn, E. L. Cord, president of both companies, will soon begin superstructure for new one-story plant, 200 x 400 ft., including parts and assembling

departments, and one-story power plant on adjoining site, 60 x 100 ft., to cost about $150,000 with equipment.

Bendix Brake Corporation, Bendix Drive, South Bend, manufacturer of automobile and aircraft equipment, has plans for a one-story foundry, to cost about $40,000 with equipment.

Northern Indiana Public Service Co., Hammond, is arranging for expansion and improvements in power plants and transmission lines, substations and distributing system, to cost about $520,000.

Citizens Motor Car Co., 31 West Thirteenth Street, Indianapolis, has filed plans for a new service, repair and garage building, to cost about $100,000 with equipment.

Sheridan Gas Co., Sheridan, is planning to rebuild part of gas generating plant destroyed by fire Jan. 8. Fred Colby is superintendent.

Indianapolis Casket Co., 521-25 West North Street, Indianapolis, is considering an addition to plant, to cost over $45,000 with equipment.

Gatke Brake Lining Co., Warsaw, manufacturer of automobile brake lining, etc., has plans for a two-story factory at Winona Lake, to cost about $25,000 with equipment.

Pacific Coast

SAN FRANCISCO, Jan. 9.—Electric Steel Foundry Co., 1328 Second Street, Berkeley, Cal., has awarded a general contract to Herrick Iron Works, 185 Campbell Street, Oakland, for a one-story foundry, to cost about $27,000 with equipment.

Wintroath Pumps, Ltd., Alhambra, Cal., has awarded general contract to Union Engineering Co., Huntington Park, Cal., for one-story plant, 80 x 100 ft., with one-story office, 44 x 66 ft., adjoining, to cost about $35,000 with equipment.

Pacific Gas & Electric Co., 245 Market Street, San Francisco, has plans for four-story steam-operated electric generating plant, to cost about $400,000 with machinery. Engineering department of company is in charge.

Smokeless Fuel Co., Salt Lake City, Utah, is planning construction of coal-treating plant, to cost about $125,000 with machinery. Joseph R. Murdock is president.

Board of Works, Seattle, is asking bids until Feb. 28 for machinery for a municipal hydroelectric power plant on Skagit River near Diablo Dam, about 30 miles from Rockport, Wash., including two 60,000-kva. generating units, reaction type water turbines, exciters, governors, valves, transformers and complete accessories. Entire project will cost about $2,000,000. City is also considering an addition to steam-operated electric generating plant at Lake Union, to increase capacity about 10,000 kw. Plans will be drawn by engineering department.

Board of Education, Tucson, Ariz., is planning installation of manual training equipment in new high school to cost about $200,000, for which plans will be drawn by Roy Place, 79 North Stone Avenue, architect.

Long Beach Glass Co., Long Beach, Cal., has plans for five buildings on 5-acre tract, recently secured near city limits, to cost more than $125,000 with equipment.

Puget Sound Power & Light Co., Seattle, has plans for a new hydroelectric generating plant at Rock Island on Columbia River, near Wenatchee, Wash., including construction of power dam 60 ft. high and 3500 ft. long. Plant will have initial capacity of 80,000 hp., and ultimate output of 200,000 hp., and will include construction of steel tower transmission line over Cascade Mountains for distance of about 100 miles. It is estimated to cost $15,000,000. Company is an interest of Engineers' Public Service Co., operated by Stone & Webster Engineering Corporation, 49 Federal Street, Boston; plans will be prepared by engineering department of last-noted organization.

Canada

TORONTO, Jan. 13.—The machine tool market is recovering from the recent holiday lull and builders and dealers report a steadily increasing demand for equipment. Small lists are also coming out for plants and additions under construction and inquiries are being received for new plants contemplated. The automotive industry is again entering the market and there is also a better demand from car and locomotive builders.

Southern Canada Power Co., Ltd., 355 St. James Street West, Montreal, is planning to build a $6,000,000 power development plant on St. Francois River, nine miles from Drummond, Que. Work will not start before spring.

Plans are being prepared by J. M. Moore & Co., architects, 489 Richmond Street, London, Ont., for a one-story addition, 60 x 110 ft., to plant of Brantford Oven & Rack Co., Brantford, Ont.

Dominion Wood Pipe Co., care of R. L. Calder, 159 Craig Street West, Montreal, will build a wood pipe factory at Lasalle, Que. Architect and engineer have not yet been appointed.

Skinner Co., Ltd., manufacturer of automobile bumpers, etc., will erect a number of buildings in connection with its plant at Oshawa, Ont.

Pinder Lumber & Milling Co., Pinder, N. B., will immediately rebuild woodworking plant and grist mill at a cost of $40,000, to replace those recently destroyed by fire.

Plans have been prepared by James, Proctor & Redfern, Ltd., engineer, 36 Toronto Street, Toronto, for a foundry addition for National Iron Corporation, foot of Cherry Street, Toronto, to cost $20,000. Contract for piling and foundation work has been awarded to the Russell Construction Co., Ltd., Harbor Commission Building.

Canadian Laundry Machinery Co., Ltd., 47 Sterling Road, Toronto, Ont., has plans for a two-story addition, work to start in spring.

Contract to rebuild buildings recently destroyed by fire at Levack, Ont., has been awarded to Fraser-Brace Engineering Co., Ltd., 107 Craig Street West, Montreal, by International Nickel Co. of Canada, Ltd., Copper Cliff, Ont. Buildings and equipment will cost $200,000.

Canadian Steel Foundries, Ltd., 307 Craig Street West, Montreal, has awarded general contract to John McGregor, Ltd., 1410 Stanley Street, Montreal, for addition and alterations to plant at Longue Pointe, Que.

Work is under way on erection of a one-story addition to plant of Canadian Tube & Steel Products, Ltd., 107 Hamilton Street, Montreal.

Dominion Woodwork, Ltd., Victoriaville, Que., whose plant was recently destroyed by fire with a loss of $125,000, has awarded contract to Henri Levasseur for a new factory.

Canadian Scale Co., 41 Ossington Avenue, Toronto, has awarded general contract to J. W. Hewitt & Sons, 56 Roncesvalles Avenue, for an addition to cost $20,000.

Neptune Meter Co., Ltd., 345 Sorauren Avenue, Toronto, has awarded general contract for one-story addition to A. R. Holmes, Ltd., 6 Hayden Street.

Foreign

OFFICIALS of International Telephone & Telegraph Corporation, 67 Broad Street, New York, have formed a new subsidiary in conjunction with its affiliated interest, Creed & Co., Ltd., London, England, under name of Creed Telegraphen Apparate G.m.b.H., Berlin, Germany, to manufacture Creed high speed telegraph printing equipment in that country. It is proposed to establish a factory and begin production soon.

Cerro de Pasco Copper Corporation, 44 Wall Street, New York, will ask bids within 60 days for new hydroelectric generating plant for mining properties near Cerro de Pasco and Oroya, Peru, to cost about $5,000,000 with transmission lines, power substations, etc. Company will also proceed with new electrolytic refining plant, including crushing and concentrating mill and other units, to cost about $1,000,000 with machinery. Company engineering department is in charge.

Ministry of Communications, Government of Portugal, Lisbon, has authorized construction of transoceanic airport on Island of Terceira, Azores group, Atlantic Ocean, about 3250 miles from New York. Project will include hangars, repair and reconditioning shop, oil storage and distributing buildings and other units, and is scheduled for completion within 18 to 24 months. A fund not to exceed $5,000,000 has been appropriated for plant.

General Electric Co., Schenectady, N. Y., has awarded a contract to Compania Fundidora de Fierro y Acero, Monterrey, Mexico, for new plant at that place for production of electric light globes, for which concession recently was secured from Mexican Government, to cost more than $250,000 with equipment. Company recently awarded general contract for incandescent lamp works at same location to H. K. Ferguson Co., Cleveland, to cost about $350,000 with equipment.

New Trade Publications

Furnace Draft Control.—Shallcross Control Systems Co., Milwaukee. Bulletin 100 of 11 pages illustrates and describes automatic furnace draft control which, it is claimed, saves 5 to 15 per cent in fuel, depending upon the type of installation and the design of the furnace.

Generating Sets.—Troy Engine & Machine Co., St. Joseph, Mich. Bulletin 106, of 16 pages, illustrates and describes Engberg direct-current generating sets. Capacity ranges from 3½ to 60 kw. and net weights from 1025 lb. to 10,750 lb.

Foundry Chaplets.—Fanner Mfg. Co., Cleveland. Catalog of 62 pages lists and illustrates an extensive line of standard and special chaplets, gaggers,

tumbling stars, perforated tin chaplets, hinge tubes and other foundry accessories. Included are ready-reference tables, scrap specifications and other data.

Technical Coatings.—Varnish Products Co., 12900 Berea Road, Cleveland. Booklet listing a line of products designated as technical coatings. These include black acid-proof coating for protection of iron and steel against corrosion, lacquers for sheet and strip steel, to prevent corrosion during handling and shipping, and for use as a rust preventive for castings before machining and for mixtures with aluminum bronze.

Better Castings.—Gray Iron Institute, Terminal Tower Building, Cleveland. This folder points out the savings to be effected through modern pattern equipment, which, it declares, is an investment in good production equipment just as much as an investment in a lathe, conveying system or other production facilities. Close cooperation between castings buyer and foundry is urged.

Rotary Railroad Car Dumper.—Link-Belt Co., 910 South Michigan Avenue, Chicago. Bulletin 1004 of 8 pages illustrates and describes the construction of a lifting type of rotary railroad car dumper, for use in both small and large plants. Those handling no more than 15 or 20 cars a day are said to be large enough for this unit.

Super-Synchronous Motors.—General Electric Co., Schenectady, N. Y. Folder GEA-1172 of 4 pages illustrates and describes super-synchronous motors in various sizes, for use in large grinding and pulverizing mills. Units illustrated range from 600 to 800 hp.

Calendars Received

Interstate Mechanical Laboratories, Inc., New York.—Color reproduction of Hintermeister's oil painting "The World Takes Wings." Size 21 x 26 in., with three-month sheets below, stapled. Preceding and coming months small, current month large. Figures about 1-in. high.

Koppers Co., Pittsburgh.—Twelve sheets, 12 x 26 in., divided into boxes, showing construction work done by Koppers Co., and three-month sheets below.

New Departure Mfg. Co., Bristol, Conn.—Three-fold red plyboard, with complete 12-leaf calendar on each fold. Sheets are stapled to backing both top and bottom to prevent paper curling. Decimal equivalent table on bottom fold. Overall size, 16 x 40 in.

Nugent Steel Castings Co., Chicago.—Twelve-leaf, thin paper, black on yellow, each sheet showing three months.

Wellman-Seaver-Morgan Co., Cleveland.—Twelve-leaf, coated stock, 14 x 29 in., showing three months. The company's products are attractively illustrated at top.

Union Switch & Signal Co., Swissvale, Pa.—Twelve sheets, thin paper, 13 x 28 in., each sheet showing three months. Current month white on black.

Whitman & Barnes, Inc., Detroit.—Four-color topographical hemisphere, 15 x 19 in., with 12 sheets 14 x 19 in. stapled to bottom, showing three months. Black on white with holidays red.

The Week's News Quickly Told

Current Events That Bear on the Course of Business

BUSINESS generally is proceeding with caution . . . Retail trade is dull, but wholesale and jobbing lines are improving. Dry goods wholesalers in Chicago report good orders.

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MANUFACTURING pace is slightly better than two weeks ago, although the "January lay-off" in the Middle West is heavier than usual. Reductions in pay of salaried positions seem to be the rule in year-end mergers.

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AUTOMOBILE industry is much encouraged by attendance and sales at the New York show, which broke all records except for 1928 . . . Detroit employment has increased somewhat since Christmas, but much distress exists. The fire department petitioned the municipality to devote the 5-per cent raise in pay to the employment of men whose families are in need.

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BUILDING permits in Washington and Vancouver are in boom proportions . . . Lumbering in the Northwest is also looking up, orders being 12 per cent greater than production for the last two years . . . Much needed rain and snow has fallen on the western coast.

* * * * *

SHOES and furniture were bought in gratifying amounts at trade conventions and showings in St. Louis and Grand Rapids, Mich. . . . Contracting for chemicals indicates a wholesome state of activity in 1930 . . . American paper and pulp industry broke all records for production in 1929 and 1930 is expected to be nearly as large. Profit margins, however, were narrow. There is approximately 25 per cent excess manufacturing capacity.

* * * * *

CHAIN stores (average of 20 reporting) show 18 per cent higher sales in 1929 than 1928, but December sales were only 11 per cent above a year ago . . . Sales by department stores in Central and Northern States decreased sharply in December, as compared to the same month in 1928, the average for the whole country being a 2 per cent loss . . . Auditors discover that United Cigar Stores are making no profits on $80,000,000 annual retail sales.

* * * * *

WHEAT declined 5c. a bushel. Grain on hand in Canada and United States appears to be just about enough to satisfy the world requirements up to August, but the anticipated export demand has not yet appeared . . . Federal Farm Board advises wheat and cotton growers to curtail acreage next spring, for it cannot guarantee 1929 prices for the 1930 crop.

* * * * *

SOUTHERN growers appear to be fairly prosperous, as indicated by a steady increase in fertilizer sales. About 85 per cent of the loans advanced to farmers in 1929 by the Federal Intermediate Credit Bank of Columbia, S. C., have already been repaid . . . During 1929 additions were made to 83 manufacturing plants served by the Southern Railway, and 137 new establishments started operations. Combined, these represent an investment of $70,000,000 and employment for 20,000.

* * * * *

INSOLVENCIES in 1929 were almost exactly the same in number and in total liabilities as in 1928, but December contributed one-seventh the total, being especially heavy in manufacturing of machinery and tools, leather goods and ceramics. Hotels and restaurants had a heavy mortality, among the trading industries.

* * * * *

AIR-RAIL rates have been reduced by Transcontinental Air Transport to less than the cost of travelling by extra-fare trains, both from coast to coast and for intermediate distances. This is expected to increase largely the number of passengers carried—4346 in the first 6 months of operation . . . C. A. Lindbergh said that improvements in 1930 models of aircraft will largely increase sales to private operators . . . Leading manufacturers say that the demands for military and postal service will constitute the backbone of the industry this year . . . Curtiss Aeroplane & Motor Corporation was awarded $100,000 for a 1900-lb. biplane representing the greatest advance in aerodynamic safety without loss in efficiency. It has an air-cooled engine, full floating ailerons at the ends of the lower wings, and slots on the leading edges of the wings, which can be opened by the pilot as he nears stalling speed . . . Army Air Corps reports the greatest advance in 1930 aviation to be the perfection of a chemical refrigerant for the motor, which reduces the required radiation surface, weight and wind resistance . . . New York police force places two amphibians in an air patrol . . . A mooring mast for dirigibles will be placed on top of the 85-story Empire State building on the Waldorf hotel site in New York . . . France has remodelled its aviation systems, consolidating the operating companies into three main groups under supervision of an Air Ministry.

* * * * *

INCOME of 7½ per cent is not excessive for a public utility, according to a ruling of United States Supreme Court in a Baltimore rate case. A fair profit is that being generally made by other businesses of equivalent risks in the same region. Income and depreciation should both be based on present value of plant actually used for the convenience of the public . . . New York State Railways, including United Traction Co. of Albany, N. Y., go into receivership . . . Insolvencies of electric railroads, which reached the peak during 1919 of 48 receiverships involving 3800 miles of track, have steadily declined until in 1929 only 5 were reported to *Electric Railway Journal* totalling 521 miles of track . . . New York subway expansion cost about $112,000,000 in 1929, and an equal amount will be spent this year.

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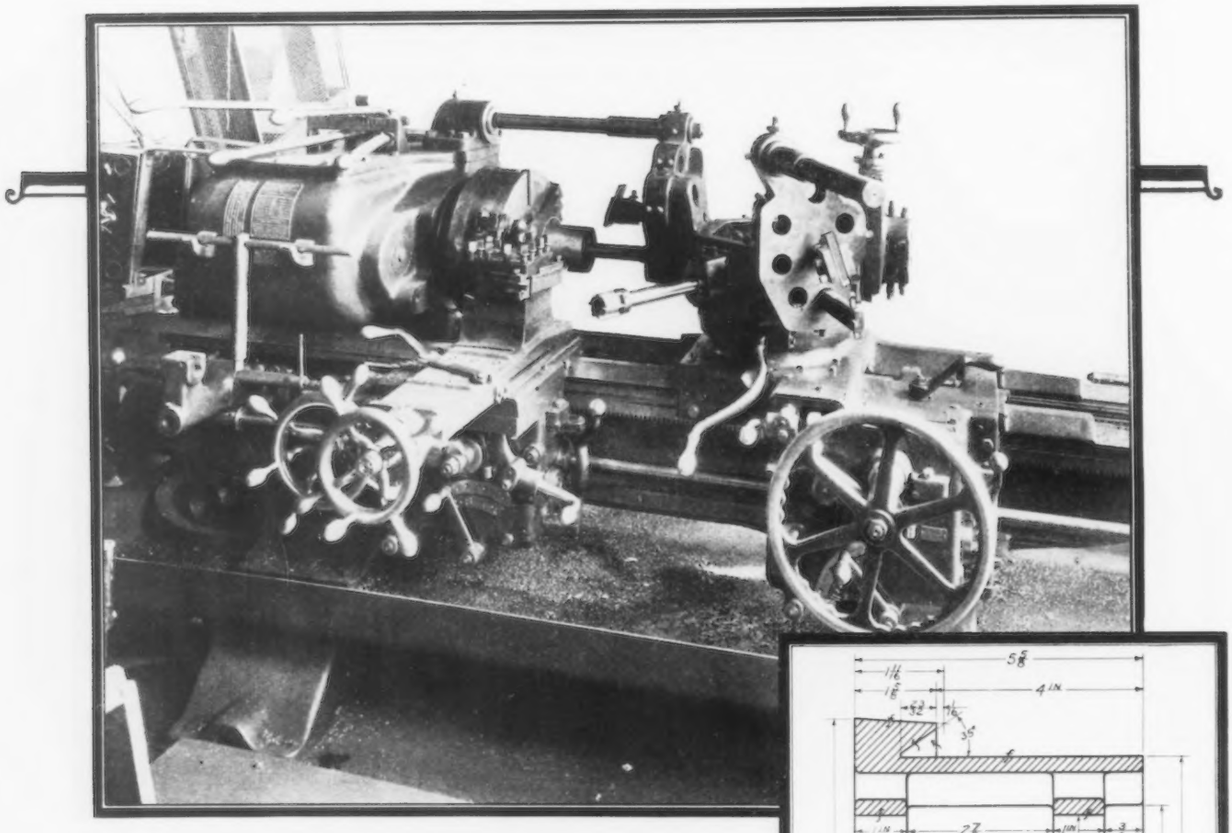
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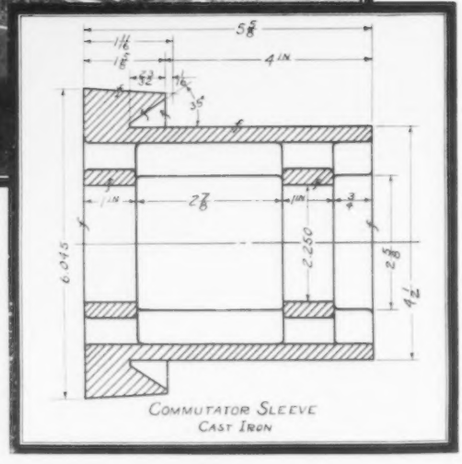
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It Pays to Replace Obsolete Turret Lathes with Modern W & S Machines





A prominent manufacturer of electric motors replaced two old type turret lathes with a new W & S 2-A machine, averaging a saving of 68% on three jobs previously done on the obsolete machines.

The photograph illustrates the set-up for one job--a commutator sleeve, on which the machining cost was reduced from 53c to 15c.

The Warner & Swasey Company

Cleveland, Ohio, U. S. A.